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August 1942

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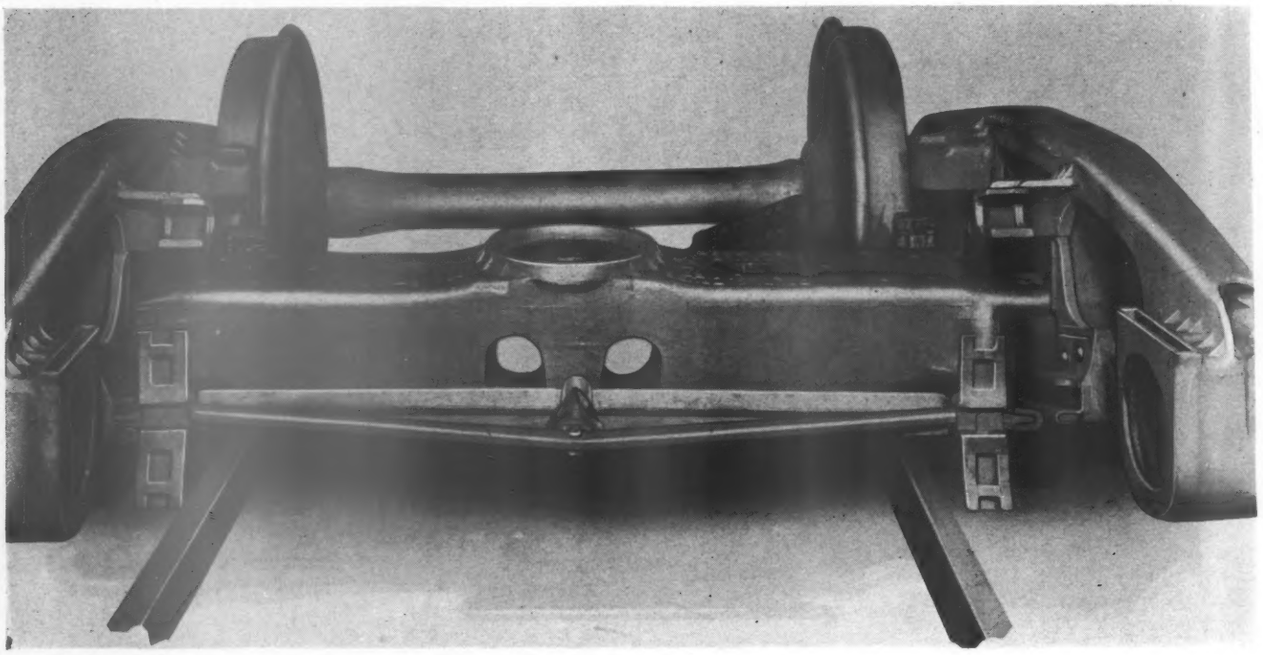

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AUGUST, 1942

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I-R PNEUMATIC TOOLS *Simplify* SHOP WORK

Left—*Resurfacing locomotive steel pedestal wedge with a Size 4F "Multi-Vane" Grinder.*

Below—*A Size C3 Chipping Hammer calking rivets on a boiler patch.*

Below—*Handling a feed water pump with a Size C Industrial Air Motor Hoist.*

Above—*A Size 534 Impact Wrench removing flexible staybolt caps from locomotive fire box.*

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The *Railway Mechanical Engineer* and its sister publications (Railway Age, Railway Engineering and Maintenance, Railway Electrical Engineer and Railway Signaling) have long been a principal means of informing the whole railroad industry of contributions toward efficiency and economy, wherever and however made. Now, for the duration, the effort of these publications will be concentrated on collecting and disseminating, in both their editorial and advertising pages, news of facilities and methods, wherever adopted, for producing more ton-miles and passenger-miles with the limited equipment, materials and labor force that will be available.

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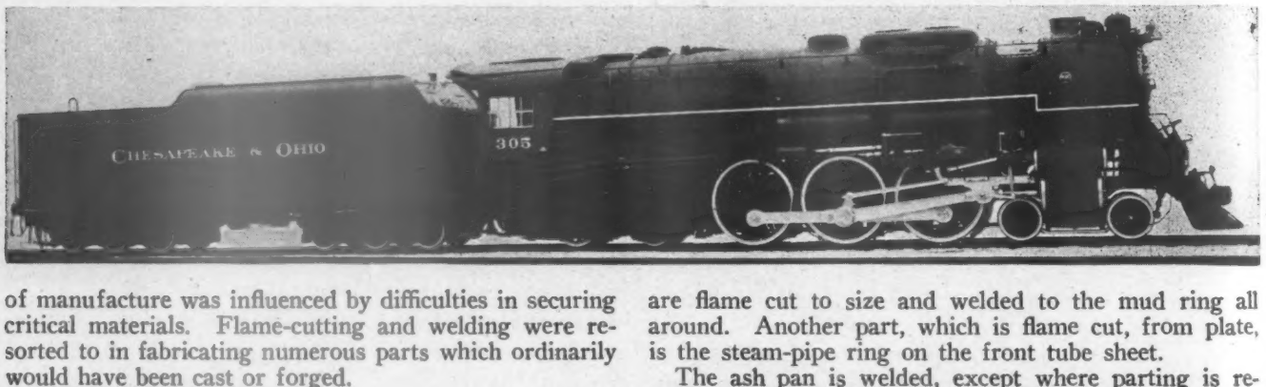
Chesapeake & Ohio Buys

4-6-4 Passenger Locomotives

Many parts of eight Baldwin-built engines fabricated by flame cutting and welding

DURING the early part of this year the Chesapeake & Ohio received eight passenger locomotives of the 4-6-4 type from the Baldwin Locomotive Works. These locomotives have 78-in. wheels and develop a tractive force of 52,000 lb., augmented by the booster to 64,600 lb. In many details the choice of materials and processes



of manufacture was influenced by difficulties in securing critical materials. Flame-cutting and welding were resorted to in fabricating numerous parts which ordinarily would have been cast or forged.

Boiler Plates Are Carbon Steel

The boilers are built of basic open-hearth steel for a working pressure of 255 lb. per sq. in. Firebox quality was used for all inside firebox sheets, including the two Thermic syphons and the back tube sheet, and for the outside throat sheet, the dome and dome cap. The thickness of the front barrel course is 1 in.; the conical course 1 1/16 in.; the third course, 1 3/32 in., and the throat sheet, 1 in. The thickness of the roof sheet is 1 1/16 in.; the side sheets, 5/8 in., and the back head, 9/16 in. The dome, although it is mounted on the conical shell course, is formed in a straight die, symmetrical about both horizontal and longitudinal axes.

The circumferential joint between the third shell course and the front wrapper sheet and between the shell course and the throat sheet is seal welded inside and outside. The outside butt strap on the third course is also seal welded in the stayed area over the combustion chamber. The joints between the roof and side wrapper sheets are located on the flat surface well below the level of the crown sheet and are butt welded in a single 60-deg. vee on the outside and back welded on the water side. These sheets are also seal welded on the outside at the throat-sheet seam and from the bottom up to the roof and side-sheet weld on the back-head seam.

There is a complete installation of Flannery flexible stays around the combustion chamber and on the throat sheet. They are applied at the breaking zones of the sides and in the two outside rows around the top and sides of the back head.

The mud ring is flame cut in four pieces from a 3½-in. plate. The pieces are then joined by double-U butt welds. Furnace-bearer lugs are welded onto the bottom of the front and back pieces. One of the drawings shows how the patterns are laid out on the plate to reduce the waste to a minimum. After fabrication, these mud rings are finished all around both inside and outside and are secured in the firebox by a single row of rivets. The bottom edges of both inside and outside firebox sheets are flame cut to size and welded to the mud ring all around. Another part, which is flame cut, from plate, is the steam-pipe ring on the front tube sheet.

The ash pan is welded, except where parting is required for its removal. Ribs are welded on the outside to prevent warping. Both the ash-pan attachments to the mud ring and the Firebar grate side-frame supports are welded to the mud ring.

The boiler is laid out for a 52-unit Type E superheater with American throttle in the header. Boiler-feed equipment includes the Worthington type 5s feedwater heater and a Nathan horizontal high-pressure non-lifting injector rated at 9,000 gals. per hour. There is a Nathan low-water alarm with automatic cut-out valve. The coal is fired by a Standard modified MB stoker with the engine on the tender. The fire door is the Franklin butterfly type.

Cast-Steel Cylinders Are Bolted and Welded to Bar Frames

The foundation for the locomotive is a set of cast-steel bar frames, with separate cradle, furnished by the General Steel Castings Corporation. All frame braces are welded to the frames. The driving-box pedestal toes are unusually large longitudinally. The pedestal caps are held by two studs set in each toe and by a lock bolt at each end which passes down through the lower frame bar.

There are two cylinder and half-saddle steel castings. These are bolted together, scarfed out, and then welded. The cylinder and frame joints and the saddle joint are also bolted and welded.

The back cylinder heads are separate castings, but are welded in place. The front valve-chamber heads are cast iron. Hunt-Spiller gun-iron bushings are applied in the cylinders and valve chambers.

The Running Gear

These locomotives have spoke driving wheels with shallow reinforcing flanges on the spokes at the inside with large radius fillets at the rim and hub. These wheels are mounted on axles with relief grooves at the inside edge of the wheel fit. The journals are fitted with Timken double-roller type bearings in two-piece housings.

Provision is made for a lateral of 3/16 in. on each side of the engine.

Both the engine and trailer trucks are Commonwealth types with Timken double-roller type bearings. Those on the engine truck are inboard and those on the trailer truck, outboard. The engine truck has 36-in. wheels. Its initial and constant lateral resistance is 30 per cent and the journal-box lateral is 3/16 in. A further instance of fabrication by welding is afforded by the engine-truck pedestal binders. These are fabricated by bending a flat steel bar to contour and welding on the pedestal lugs.

The trailer truck has 36-in. front wheels and 45-in. rear wheels. The front axle has a lateral movement of 1 in. and is fitted with the Timken three-roller lateral-motion device which provides a 10 per cent initial and constant resistance. The rear trailer axle has a lateral movement of 3/16 in. On this axle drives a Franklin Type E short cut-off booster with slip control.

The counterbalancing is based on static balancing in all driving wheels. In calculating the weights of the reciprocating parts the scale weights of the front and back ends of the main rod are used. Reciprocating weights are 2,207 lb. on each side, and a total of 820 lb. of overbalance is distributed, 250 lb. in each front and back wheel and 320 lb. in each main wheel. This leaves on each side an unbalanced reciprocating weight of 3.16 lb. per 1,000 lb. of locomotive weight.

Driving Gear

The pistons are cast steel, with Hunt-Spiller gun-iron bull rings, riveted on. The cylinder packing is the Hunt-Spiller duplex type with combination gun-iron and bronze rings. The crosshead is carbon cast steel of the multi-bearing type.

The crank pins are of open-hearth steel. All contain grease cavities fed through fittings on the outside ends of the pins. The side rods have pressed-in bronze bushings. The back end of the main rod has a bronze floating bushing working inside a pressed-in gun-iron bushing. Both the back end of the main rod and the side-rod middle connection have hard-grease fittings.

The piston valves are 14 in. in diameter and they have Hunt-Spiller gun-iron bull rings with duplex combination packing. The valve-rod crosshead was formed by flame cutting. Special attention was given to providing large steam passages. The dry pipe is 9½ in. and the steam pipes 8½ in. inside diameter.

The locomotive is equipped with the Baker valve gear with needle bearings on all pin connections and vulcanized red fibre liners for lateral wear. The reverse gear is the Franklin Precision Type F2 with 10-in. cylinders.

Spring Hangers Forged from Solid Stock

The double driving-spring hangers are symmetrical in form and are forged by drawing down the body from solid stock. No upsetting was permitted. The spring lugs are mostly made by welding a piece of bar stock of suitable diameter to the base of a piece of boiler-brace tee-iron. The stems of the tees were machined to fit the spring slots and the bar stock drilled to the size required to take the bushing. Pins and bushings are casehardened and have Alemite fittings.

The spring saddles are fabricated from 1¼-in. boiler plate, with spring-stop lugs welded on the top. These saddles have exceptionally long bearings on the top of the driving boxes.

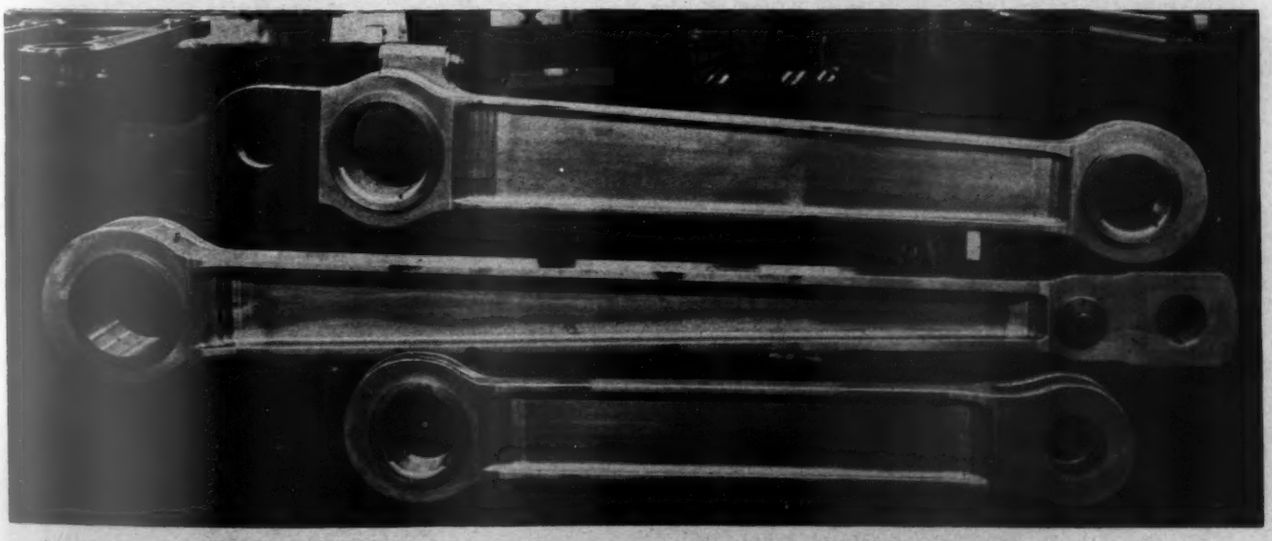
Lubrication

Each locomotive has two Nathan DV-7 36-pint mechanical lubricators. That on the right side supplies valve oil and that on the left, engine oil. The valve-oil lubricator has 13 single-pump feeds and, in addition to valve chambers and cylinders, furnishes lubrication to the guides and the hot-water pump. The engine-oil lubricator has eight single and four double pumps, feeding to the valve-rod crossheads, engine-truck center plate, trailer radius-bar seat, furnace-bearer shoes and radial buffer face, in addition to engine-truck, trailer-truck and driving-box pedestal faces.

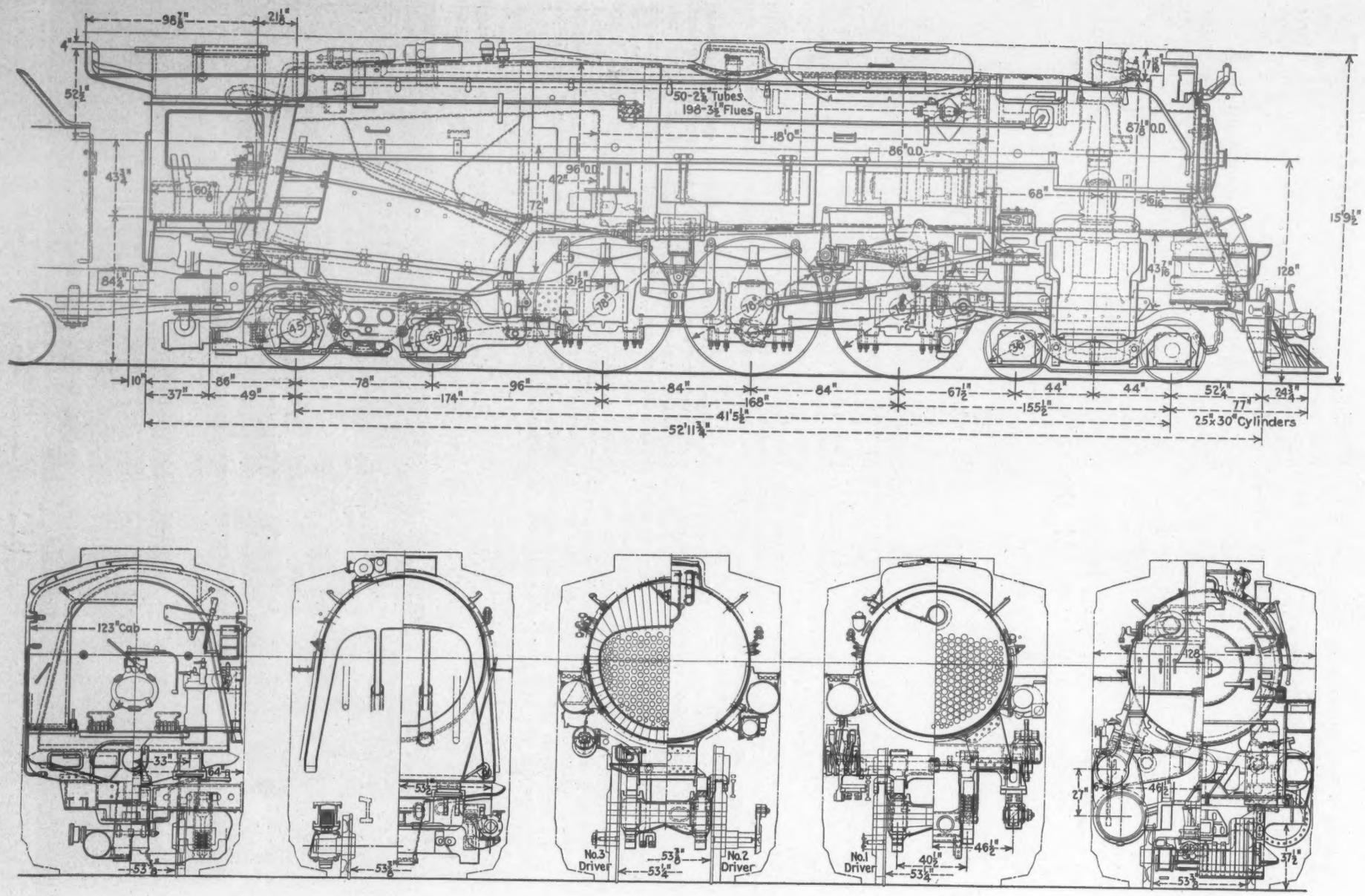
Grease lubrication through Alemite grease fittings is provided for the power reverse gear and reverse-shaft bearings, valve-motion bearings, spring-rigging and brake-hanger pins, throttle-rigging bearings, ash-pan dump-shaft bearings, the stoker gear case, engine- and trailer-truck lateral-motion devices, and the side-rod knuckle pins. Hard grease is used on the crank pins, crosshead wrist pins, and the back ends of the eccentric rods. The booster and the air-pump steam lines are fed from Edna automatic lubricators.

Boiler Fittings

Among the miscellaneous parts which were fabricated by cutting and welding are the throttle-lever fulcrum



The main and side rods



Elevation and cross-sections of the C. & O. 4-6-4 type passenger locomotive

bracket and the throttle compensating lever. Considerable ingenuity is reflected in the design of the hand-rail columns and boiler steps. These details are designed so that they may all be applied to the boiler with studs of a single length. Instead of using spacers to bring the base of the columns out to the surface of the jacket, the base is bolted directly against the boiler and is surrounded by a

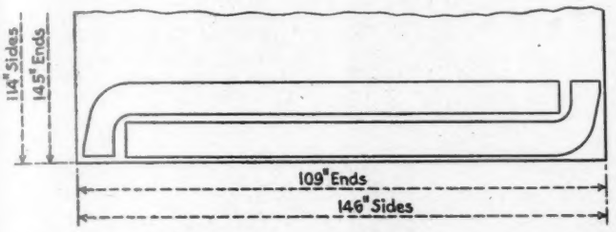
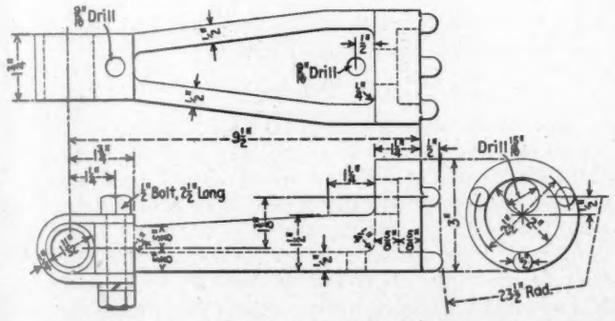


Plate sizes permit the flame cutting of mud-ring sections with a minimum of waste



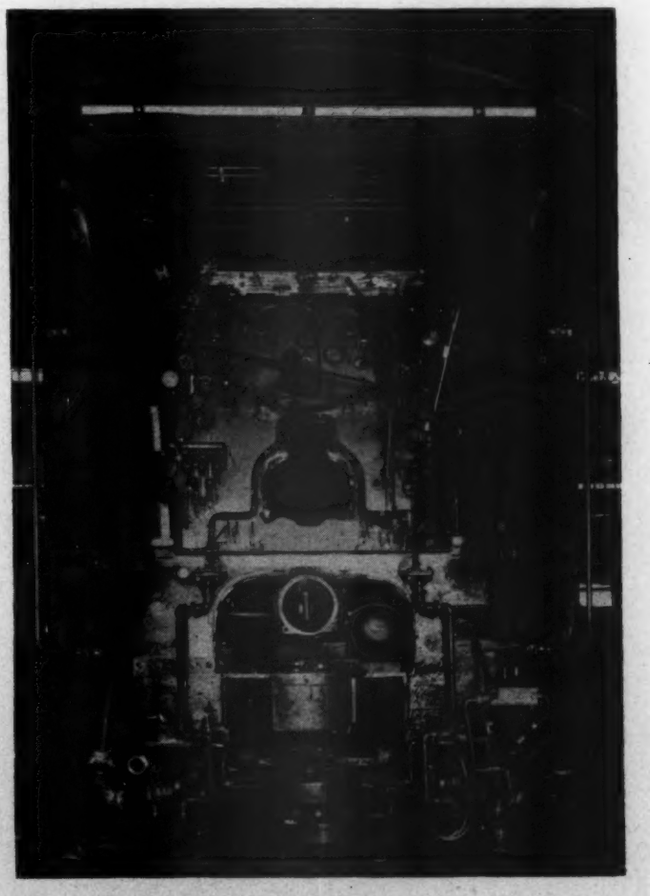
The handrail column, the base of which is bolted directly against the boiler shell, requires studs of but one length

lagging ferrule. On the base are three small projecting lugs which give the column a three-point support against the boiler. By reducing the length of one or more of these lugs on a grinding wheel, the column can be readily aligned, irrespective of the shape or angle of the surface against which it is bolted.

The locomotives have steel cabs fabricated by welding

General Dimensions, Weights, and Proportions of the Chesapeake & Ohio 4-6-4 Type Passenger Locomotive

Railroad	C. & O.
Builder	Baldwin
Type of locomotive	4-6-4
Road Class	L-2
Road numbers	300-307
Date built	1942
Service	Passenger
Dimensions:	
Height to top of stack, ft.-in.	15—9½
Height to center of boiler, ft.-in.	10—8
Width overall, in.	10—8
Cylinder centers, in.	93
Weights in working order, lb.:	
On drivers	217,500
On front truck	93,500
On trailing truck	128,500
Total engine	439,500
Tender	393,000
Wheel bases, ft.-in.:	
Driving	14—0
Rigid	14—0
Engine, total	41—5½
Engine and tender, total	91—8¼
Wheels, diameter outside tires, in.:	
Driving	78
Front truck	36
Trailing truck:	
Front	36
Rear	45
Engine:	
Cylinders, number, diameter and stroke, in.	2—25 x 30
Valve gear, type	Baker
Valves, piston type, size, in.	14
Maximum travel, in.	8
Steam lap, in.	1⅜
Exhaust clearance, in.	⅜
Lead, in.	3/16
Boiler:	
Type	Conical
Steam pressure, lb. per sq. in.	255
Diameter, first ring, inside, in.	84
Diameter, largest, outside, in.	96
Firebox length, in.	135⅛
Firebox width, in.	96⅛
Height mud ring to crown sheet, back, in.	69¼
Height mud ring to crown sheet, front, in.	92¼
Combustion chamber length, in.	42
Arch tubes, number and diameter, in.	2—3½
Thermic syphons, number	2
Tubes, number and diameter, in.	50—2¼
Flues, number and diameter, in.	198—3½
Length over tube sheets, ft.-in.	18—0
Net gas area through tubes and flues, sq. ft.	9.22
Fuel	Bit coal
Grate area, sq. ft.	90
Heating surfaces, sq. ft.:	
Firebox and comb. chamber	345
Arch tubes	19
Thermic syphons	96
Firebox, total	460
Tubes and flues	3,773
Evaporative, total	4,233
Superheater	1,810
Comb. evaporative and superheater	6,043
Tender:	
Type	Water bottom
Water capacity, gals.	21,000
Fuel capacity, tons	30
Trucks	6-wheel
Journals, diameter, in.	7-roller bearing
Rated tractive force, engine, lb.	52,000



Rear end of the locomotive showing the engine and tender connections

The driving wheels are the spoke type with reinforcing ribs—The Timken double-roller type journal bearings have two-piece housings

Rated tractive force, booster	12,600
Total rated tractive force, lb.	64,600
Weight proportions:	
Weight on drivers ÷ weight engine, per cent	49.48
Weight on drivers ÷ tractive force	4.18
Weight of engine ÷ evaporative heating surface	103.82
Weight of engine ÷ comb. heating surface	72.72
Boiler proportions:	
Firebox heating surface, per cent comb. heating surface	7.61
Tube-flue heating surface, per cent comb. heating surface	62.43
Superheater heating surface, per cent comb. heating surface	29.95
Firebox heating surface ÷ grate area	5.11
Tube-flue heating surface ÷ grate area	41.92
Superheater heating surface ÷ grate area	20.11
Combined heating surface ÷ grate area	67.14

Pipe connections under the left side of the cab

Gas area, tube-flues, per cent of grate area	10.24
Evaporative heating surface ÷ grate area	47.03
Tractive force ÷ grate area	577.78
Tractive force ÷ evaporative heating surface	12.28
Tractive force ÷ comb. heating surface	8.60
Tractive force x diameter drivers ÷ comb. heating surface	671.19

and are fitted with Edwards brass sash. Running boards are steel with diamond pattern treads. Superheated steam is supplied to the blower and whistle. All other auxiliaries receive saturated steam. The blower valve, the stoker-engine throttle, and the feedwater-pump throttle are Lunkenheimer valves with stainless-steel stems and nickel-alloy seats and discs.

Tender

The tender tanks are built on a General Steel Castings water-bottom under-frame and are of riveted construction throughout. The coal-space sheets and the tank top are of copper-bearing steel. The remainder of the tank plates are of carbon steel. The water filling hole is placed longitudinally instead of transversely in the roof of the tank. It is 192 in. long by 18 in. wide.

The tender trucks are the Buckeye six-wheel type with multi-wear rolled-steel wheels 36 in. in diameter. The wheel base is 10 ft. The axles have 7-in. journals fitted with Timken double-roller type outboard-bearing boxes. Each bolster-spring set includes a Cardwell-Westinghouse snubber. Truck brakes are the Simplex class type.

Partial List of Materials and Equipment on the Chesapeake & Ohio 4-6-4 Type Passenger Locomotives

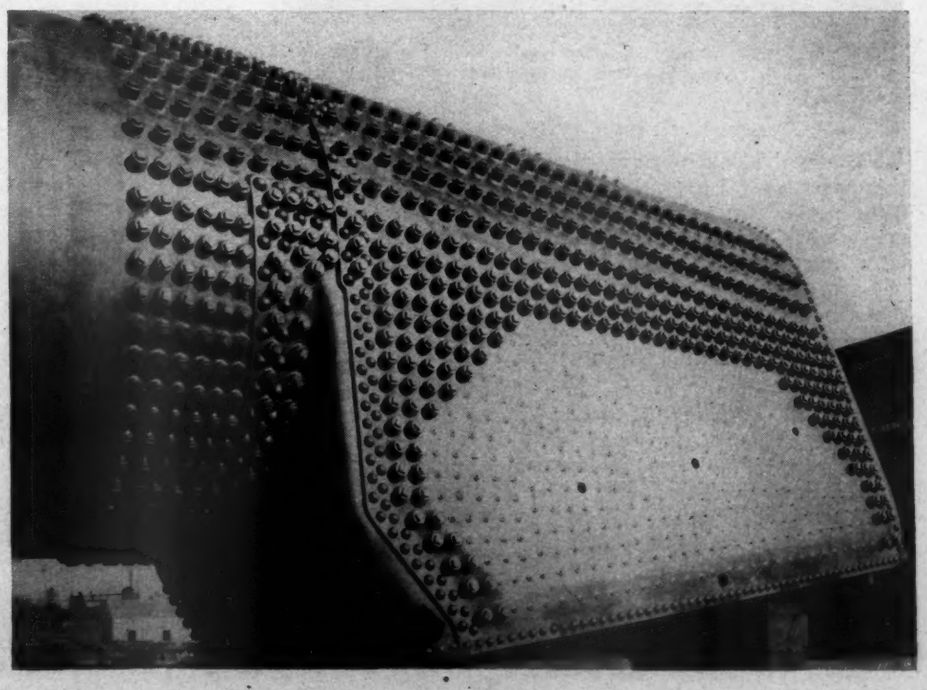
Frames and cradles; engine and trailer trucks	General Steel Castings Corp., Eddystone, Pa.
Wheels and axles	Standard Steel Works Division of the Baldwin Locomotive Works, Philadelphia, Pa.
Tires	American Locomotive Co., Railway Steel Spring Div., New York
Crank pins	Camden Forge Co., Camden, N. J.
Roller bearings; lateral motion device	The Timken Roller Bearing Co., Canton, Ohio
Semi-elliptic and coil springs	Pittsburgh Spring & Steel Co., Pittsburgh, Pa.
Snubber springs	Cardwell Westinghouse Co., Chicago
Bumper	Ohio Steel Foundry Co., Lima, Ohio
Coupler pilot	National Malleable and Steel Castings Co., Cleveland, Ohio
Uncoupling rigging	Standard Railway Equipment Company, Chicago
Pilot coupler pocket	Symington Gould Corp., Rochester, N. Y.
Drawbar; safety bar; pins	Ewald Iron Co., Louisville, Ky.
Radial buffer; booster	Franklin Railway Supply Co., Inc., New York
Rerailer	American Chain & Cable Company, Inc., New York
Air brakes	New York Air Brake Co., Watertown, N. Y.
Flexible connections to air reservoirs, steam supply to air pump, in air line between distributing valve and reservoir, air line to reverse cylinder	Barco Manufacturing Co., Chicago
Air gage	Ashton Valve Co., Boston, Mass.
Cylinders	General Steel Castings Corp., Eddystone, Pa.
Reverse gear	Franklin Railway Supply Co., Inc., New York
Crossheads	Ohio Steel Foundry Co., Lima, Ohio
Rod bushings	Magnus Metal Div., National Lead Co., New York
Valve gear	Pilliod Co., New York
Valve extension handle universal joints	Manning, Maxwell & Moore, Inc., Locomotive Equipment Division, Bridgeport, Conn.
Piston-rod and valve-stem packing	T-Z Railway Equipment Co., Chicago
Drain cocks	Barco Manufacturing Co., Chicago
Gaskets	The Garlock Packing Company, Palmyra, N. Y.
Piston bull rings; cylinder and steam-chest bushings; back-end main-rod bushings; piston and piston-valve packing	Hunt-Spiller Manufacturing Corporation, Boston, Mass.

Mechanical lubricators	Nathan Manufacturing Co., New York
Automatic lubricators, booster and air pump	Edna Brass Mfg. Co., Cincinnati, Ohio
Alemite fittings	The Prime Manufacturing Co., Milwaukee, Wis.
Boiler and firebox steel	Lukens Steel Co., Coatesville, Pa.
Smokebox front	The Okadee Company, Chicago
Smokebox netting	The W. S. Tyler Co., Cleveland, Ohio
Arch brick	American Arch Co., Inc., New York
Syphons	Locomotive Firebox Co., Chicago
Arch tubes; boiler tubes; flues	(2) The Babcock & Wilcox Tube Co., Beaver Falls, Pa. (6) National Tube Co., Pittsburgh, Pa.
Staybolt iron	Ewald Iron Co., Louisville, Ky. Old Dominion Iron & Steel Works, Inc., Richmond, Va.
Staybolts-Flexible, flexible expansion and hollow rigid	Flannery Bolt Co., Bridgeville, Pa.
Boiler and firebox rivets	The Champion Rivet Co., Cleveland, Ohio
Boiler braces; pins	Ewald Iron Co., Louisville, Ky.
Superheater; superheater header throttle	The Superheater Company, New York
Superheated-steam-line shut-off valve	Crane Co., Chicago
Throttle	American Throttle Co., New York
Lagging	Johns-Manville Sales Corp., New York
Pipe covering	Union Asbestos & Rubber Co., Chicago
Pipe, iron	A. M. Byers Co., Pittsburgh, Pa.
Pipe clamps—tender	Illinois Railway Equipment, Chicago
Feedwater heater	Worthington Pump and Machinery Corp., Harrison, N. J.
Injectors; boiler checks; low water alarm	Nathan Manufacturing Co., New York
Washout plugs	Huron Mfg. Co., Detroit, Mich. American Locomotive Co., New York
Blower valves; stoker engine throttle; feed pump throttle	The Lumkenheimer Company, Cincinnati, Ohio
Blow-off cocks; muffler; cylinder cocks	The Okadee Company, Chicago, Ill.
Smokebox blower fittings	Barco Manufacturing Co., Chicago
Stoker	Standard Stoker Co., Inc., New York
Fire doors	Franklin Railway Supply Co., Inc., New York
Grates	Waugh Equipment Co., New York
Hose strainer	T-Z Railway Equipment Co., Chicago
Cab curtains	The Lehon Co., Chicago
Cab sash	The O. M. Edwards Co., Inc., Syracuse, N. Y.
Windshields; clear-vision windows	The Prime Manufacturing Co., Milwaukee, Wis.
Running boards	Alan Wood Steel Co., Conshohocken, Pa.
Safety valves; steam and back-pressure gages	Manning, Maxwell & Moore, Inc., Locomotive Equipment Division, Bridgeport, Conn.
Globe and angle valves	American Radiator Co., New York
Turret valves; water-column gages; gage cocks; rail washers	Nathan Manufacturing Co., New York
Steam-heat gage	Ashton Valve Co., Boston, Mass.
Steam-heat regulators	Gold Car Heating & Lighting Co., Brookyln, N. Y.
Suction hose	Hewitt Rubber Corp., Buffalo, N. Y.
Sanders	Viloco Railway Equipment Co., Chicago
Headlight generators	The Fyle-National Company, Chicago
Flexible connections steam line to headlight generator	Barco Manufacturing Co., Chicago
Bell ringer	Superior Railway Products Corp., Pittsburgh, Pa.
Speed recorder	General Electric Company, Schenectady, N. Y.
Whistle	Nathan Manufacturing Co., New York
Whistle valve and cylinder	Viloco Railway Equipment Co., Chicago
Flexible connections, misc.	Barco Manufacturing Co., Chicago
Flexible connections between engine and tender	Franklin Railway Supply Co. Inc., New York
Rear uncoupling arrangement	Standard Railway Equipment Company, Chicago

Tender:	
Frame	General Steel Castings Corp., Eddystone, Pa.
Frame plugs	Huron Mfg. Co., Detroit, Mich.
Trucks	Buckeye Steel Castings Co., Columbus, Ohio
Wheels	Standard Steel Works Division of the Baldwin Locomotive Works, Philadelphia, Pa.
Axles	American Locomotive Co., New York
Roller bearings	The Timken Roller Bearing Co., Canton, Ohio
Coupler; draft-gear yoke	National Malleable and Steel Castings Co., Cleveland, Ohio
Brakes, clasp	American Steel Foundries, Chicago
Draft gear	W. H. Miner, Inc., Chicago
Tank steel	Lukens Steel Co., Coatesville, Pa.
Tank valves	Wm. Powell Co., Cincinnati, Ohio

Engine and tender connections from the right side

McLaughlin flexible connections are installed between the engine and tender for air and steam. Barco connections are inserted in air lines at the air compressors, main-reservoir connections, in the line between the distributing valve and main reservoir, and at the reverse-gear cylinder. They are inserted in steam lines to the air compressors and headlight generator. The engine and tender connections include Ewald-iron drawbar, safety bar and drawbar pins, with Franklin E2 type buffers.



The roof and side wrapper sheets are joined by butt welding—The throat-sheet and side-sheet seams are seal welded

Symington's

War Production Drive*

One of the posters featuring a committee member—The appeals are intimate—Note his signature

By C. J. Symington†

Unique methods, dominated by a spirit of sincerity, bring results

We have had an interesting and gratifying experience these past several weeks. We have seen a labor-management production drive committee come into being and go to work in one of our plants. Even though it has been functioning less than three months we believe the basic idea is a workable means of materially assisting in the production of the many materials needed for the war effort.

When the war production drive idea, with its labor-management committee, was first broached by the government, we, doubtless like many others, were somewhat skeptical of its workability. On the other hand, we were aware of the necessity for increasing our production of war materials. Our labor situation was stable under a "union shop" contract. We could not find any tenable reason why the labor-management production drive committee idea should not be given a trial. Try it we did.

Our first step was to reach an understanding with the representatives of our employees' union to the effect that the labor-management committee idea dealt only with matters relating to *more production;* that matters ordinarily coming within the field of our contract with the union could not and would not be the business of the labor-management production drive committee. With this understanding reached the union was requested to designate eight member employees for service on the production drive committee, four as committeemen and four to serve as alternates. Management then designated eight employees from the supervisory force, four of whom serve as committeemen and four as alternates. The general manager of the plant has acted as chairman and the manager of industrial relations as vice-chairman.

Management had no voice, suggestive or otherwise, in the selection of the labor members of the Committee. In selecting management members care was taken to designate supervisors who stood high in the opinion of our labor ranks.

Sincerity the Keystone

In the process of forming the committee and during its early meetings there developed what we believe to be the keystone of the whole labor-management committee plan—*sincerity.* All concerned soon realized (and expressed themselves accordingly) that unless there was confidence in the sincerity of the members, one to another, there could be nothing constructive resulting from the committee's labors. Also if the committee as a whole, or any of its members, could not feel confident in the sincerity of management (or vice versa) the trial would result in failure.

From the outset, the committee realized that its efforts could not result in success unless the plant personnel could be encouraged to take an active part in the program. As a windfall in this direction, at about the time the committee had started on its work, we were able to arrange to have an army tank driven into the plant. This afforded the men an opportunity to see where and how the steel castings they were making were assembled into fighting machines. The interest of the personnel was intense. The men were all around the tank pointing out where the particular castings they worked on were used. This incident proved a worthwhile demonstration and seemed to bring to the men graphically a realization that they were in fact a part of the great war production effort. The committee was alert to capitalize this quickening of interest and they

* An address before the War Conference of the National Industrial Advertisers Association, Atlantic City, N. J., June 26, 1942.
† President, The Symington-Gould Corporation.

used this incident as a setting for subsequent moves in arousing and holding the interest of the personnel.

Suggestion Boxes Installed

The suggestion box idea was the next move of the committee. Suggestion boxes were installed in each department of the plant and the men encouraged by bulletin board notice and other plant publicity methods to submit ideas for the purpose of improving the quantity and quality of our production. To further this idea, management appropriated a sum to be awarded monthly for suggestions considered by the committee to have merit. The awards were to be made in the form of war bonds and war stamps. The committee was to be sole judge of the practicability and value of all suggestions submitted and be completely responsible for all awards. In the working out of the first series of awards the committee was solicitous in asking the opinion of management respecting the many suggestions submitted. The opinion of management, however, was not controlling but was merely advisory. The final decision remained with the committee.

Realizing and appreciating the value of advertising technique, the committee looked about for promotional posters that would aid the effort. To further this phase, management made available to the committee public relations and advertising consultants to whip the ideas of the promotional campaign posters evolved within the committee into practicable and workable shape. You may be interested to hear the attitude of the committee toward the poster question in general. They were unanimous in their opinion that the posters be kept on the serious side and rather than ridicule our enemies that the posters stress the part being played by the *war production army*, in backing up the *fighting army*. As one member of the committee expressed it—"It is rather silly to make faces at someone who is hitting you on the chin."

Posters Personalized

Another idea developed within the committee was to personalize the posters and advertising material, that is, to bring into these posters the faces and scenes with which our own men were familiar. A series of posters embodying this idea are now in work. There will be eight. The upper pictures which are done in one color are actual photographs taken in the eight major departments in the plant with drawings of battle scenes to dramatize to the men how important their contribution and work is toward the ultimate goal of winning the war.

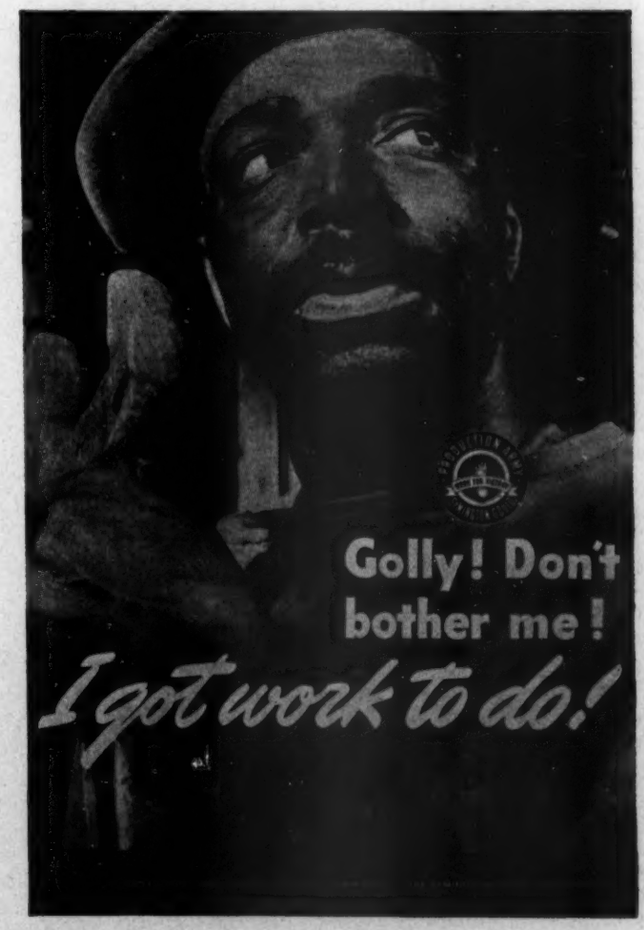
Another series of eight posters has been designed around the four labor members of the committee and the four labor alternates. Signed photographs of these eight men with appropriate captions, chosen by the committee, will be displayed on the various departmental bulletin boards.

In the development we, of course, have encountered recommendations by the committee which under ordinary conditions we would not be inclined to carry out. We have, however, had the courage to permit the committee to go ahead and make its mistakes with the result that the committee is becoming more careful, more thoughtful, and the mistakes are becoming fewer. In any experiment of this kind the acid test is—Will it work in practice? I can say to you today that it has worked with us.

Production Increased Greatly

During the month of May our workers contributed 230 suggestions, 80 of which were put into practice and 80 prizes were duly awarded. The top prize of a $100.00 war bond went to an employee whose suggested method of checking patterns is definitely increasing the efficiency of his department; a special prize was awarded to a worker who wrote an inspiring poem which the committee is using as a basic theme for a poster; all of the other suggestions for which awards were made are of definite practical value to the company in its production efforts. We cannot do less than give the suggestion box of the labor-management committee credit for bringing them to light.

Now, the all important business of increasing production. You will be interested to know that within 30 days after the drive was launched (and this was before plant posters and other means of stimulating interest had been brought into play) our production jumped 14 percent in volume and the output per man hour increased 8¾ percent. In order that every employee may know currently how the plant is producing throughout a week, a large production chart or target has been erected directly inside the main gate where everyone entering the plant may see it. The huge target is flanked on either side by the soldier on the fighting front on the left, and the production soldier on the right. Incidentally, the production soldier is one of our own men. The general theme symbolizes the importance of complete support for the men on the firing line. The target provides the scale on which daily production progress is displayed. The trajectory of the tracer bullet being fired from this gun is lighted to indicate production for the week.



Poster showing one of the workers in the plant, and reflecting his attitude

CASTINGS FOR TANKS
PRODUCTION ARMY
WORK FOR VICTORY
SYMINGTON-GOULD
WE ARE DOING OUR PART ON TIME!
Erected by THE LABOR-MANAGEMENT WAR PRODUCTION DRIVE COMMITTEE THE SYMINGTON-GOULD CORPORATION

Bulletin board near entrance to plant identifying the armor castings made by Symington-Gould

Donald Nelson, in inaugurating the war production drive, indicated the necessity and desire of the government for an increase of 25 per cent in production. Our committee has set its goal at 40 per cent increase over what the production of the plant was before the drive got under way. The committee realizes that this goal will not be reached, except with the aid of additional facilities, some of which are now in course of installation. We are confident, however, that the efforts of the committee will result in our obtaining the maximum production from our facilities and our man-power.

To emphasize the importance of the production chart, the committee staged a rather elaborate but singularly impressive unveiling ceremony. The War Production Board in Washington was represented, as was the Rochester Ordnance District, the city government and United Steel Workers of America. Ray Millholland, chief, Technical Unit, War Production Drive Headquarters, was the principal speaker and prizes for suggestions were given out by City Councilman Frank E. Van Lare. It was a most impressive demonstration and extremely effective in adding to the enthusiasm of the workers.

Post-War Possibilities

And now, in closing, may I leave one thought with you which may be worth exploring? In doing so I do not wish to take away any of the emphasis we must continue to put on the war effort. It has been well said that we should not waste time and energy in developing what kind of peace we will make, or what problems we must face in the post-war readjustment until *after* we have won the war. *But,* if it can be definitely proven that in the melting pot of actual practice during the war, the labor-management committee plan of the War Production Drive Headquarters has been responsible for a real improvement in labor relations and instrumental in stepping up production during the war period, is it not possible that the same basic idea of a partnership—labor, management and government—in the spirit of wholehearted cooperation, will be the means of solving a great many of the problems to arise in the inevitable post-war readjustment?

* * *

How Cooperative Plan Works

By Charles F. Maw*

Type of problems considered at each meeting—Safety rules devised as the result of such conferences

THE emergency confronting us as a nation should bring home to every American citizen the urgent necessity of prompt, methodical and continued application to duty. Whether our responsibilities in the sphere of life in which we move be great, or not so great, we should do our best.

On the first Tuesday morning of each month representatives of the mechanical department assemble in my office. The various assistant foremen and the representatives of the various crafts attend. The stores department and the transportation department are also represented. This is known as the Co-operative Plan.

Program for Co-operative Meetings

Approximately 45 minutes is the allotted time for these meetings. The value derived from the discussions and suggestions cannot be estimated in dollars. The agenda for each meeting is prepared beforehand by the secretary, who is chief clerk in the local mechanical-department office, and usually consists of the following items:

1—Suggestions for improved efficiency in operation. Time is valuable.

2—Recommendations for expediting repair work by approved short-cut methods, and testing out, after a check-up of suggested economical time- or labor-saving operations.

3—Conservation of material. This is a vital factor at this time, and is discussed in two sections.

(a) Stocks to be kept to the minimum with careful regard for the requirements by reason of anticipated business. Extreme stock reduction, with a possibility of jeopardizing operations, is discouraged, as also is overstocking, which would tie up useful materials so necessary to railroad operations at other points.

(b) Salvaging and reclamation of second-hand and scrap material. Good judgment and proper supervision frequently bring remarkable results. Here is an example. An engine is on the drop pit and rod bushings are being changed as required. The bore of the bushings removed has reached the point where it exceeds the diameter of the pins by the limits allowable, yet the bushings are not otherwise in condition to be discarded. They are carefully gone over; a light cut on the outer circumference, together with a similar operation inside the bore may place these bushings in serviceable condition for a rod or pin of another locomotive. Valuable time and material are thus saved.

4—Safety First. The following pledge hangs on the office wall: "I will railroad according to the Book of Rules. I will do all in my power to guard against unsafe acts on my part. If I see a fellow employee doing his work in an unsafe manner, I will speak to him as a friend, and use my moral influence to have him perform his duties in the safest possible manner. I will remember and practice at all times safety first."

The list of personal injuries sustained by employees in the district in which this terminal is located and included, is carefully read and discussions as to the cause are encouraged. Where carelessness is apparent, the person is interviewed and cautioned by myself and also by representatives of the employees. Usually this brings about a correction. The man who loses a leg, or an arm, or an eye, or in some manner becomes less than normal in his working capacity, is to the extent of his disability putting a brake on transportation or industry, or perhaps both. Never in the history of our country was man-power more important.

5—Fire Prevention. This is a live question at the moment. Property destroyed by a fire is a positive and irreplaceable loss. Fire extinguishers of the portable type are checked at frequent intervals and records kept. The premises are kept entirely free of all accumulations of combustible refuse such as old waste, shavings, etc. The pipes from stoves and heaters are periodically checked and replaced as required. Clothes lockers, tool boxes, storage closets and cupboards are inspected from time to time and must be kept neat and clean. A well-equipped fire brigade is maintained, consisting of members of the staff, trained in the use of the equipment.

The storage of lumber, wood, oil, waste and like commodities is carefully planned and watched daily. Portable extinguishers and pails of sand are placed convenient for emergency. Fuses and torpedoes are kept in fireproof cabinets. Electric wiring and fixtures are inspected frequently and corrections made by qualified men. Grounds and short circuits are dangerous and expensive.

6—At this place on the program cooperation is stressed, particularly in regard to the war effort. The urgent necessity for the care of rubber hose and other like materials is urged. The purchase of Defense Bonds and Stamps is recommended and encouraged.

Accident Prevention Suggestions

So far as safety first is concerned, we must remember that 60 per cent of the accidents occurring daily on the railroads can be avoided if proper and reasonable care is taken. Here are safety rules applicable to the mechanical department that have been developed as a result of the Cooperative Plan:

1—Don't climb over couplers between cars, and never pass beneath a car. It may be moved quite unexpectedly.

2—If necessary to cross tracks or yards, look in all directions before so doing.

3—Never step from one track to another without being positive you are safe—"Look before you leap."

4—No matter how insignificant your job may seem, do it well. Keep your mind on your work. If your mind wanders you may lose a finger or a hand, or worse.

5—Don't violate rule "G." Think of the other fellow whose

* Locomotive Foreman, Canadian National-Grand Trunk Lines in New England, Island Pond, Vt.

life may be endangered along with your own. Take your proper rest.

6—Never pass immediately in front of or behind engines or cars, or between them when standing close together. You may get caught.

7—Don't attempt to operate a machine unless you are fully qualified. Never operate a machine unless instructed by your foreman.

8—Use great care when shifting belts by hand when machine is in motion. Preferably use a guide stick or stop the machine.

9—Never remove guards from a machine for convenience sake. Keep them in their proper position.

10—When finished with machine leave all guards in proper position. Think of the other fellow.

11—Never step upon the front footboard of a moving engine, or the front side step of a moving caboose or coach. It is dangerous.

12—Keep clear of escaping steam. You may collide with some object obscured from view by the steam, or walk into a pit.

13—Never fool with torpedoes.

14—Remember the clearance is limited between roundhouse doors and engines moving in and out of the shop. Don't ride on side steps.

15—When lifting material act in unison, both in taking hold and letting go.

16—Never use a scaffold, horse, ladder or any other support without testing it carefully.

17—Exercise every care that no person is passing below when it becomes necessary to drop tools or material from above, and warn in advance.

18—Never leave tools or other material overhead on scaffold or swing planks when you have finished your job.

19—Never pass under a load being transferred by hoist, crane, or other mechanism.

20—Never cut off the heads of bolts and rivets unless flying heads are protected against by a broom or bagging, or other safety device.

21—When using cutting or welding torch, always protect yourself with proper goggles.

22—Never use the emery wheel without using goggles—and if you see a fellow worker attempt this, call it to his attention.

23—Replace all covers on drop pits, manholes, etc., when you have finished working.

24—Never clean or oil machinery when it is in motion.

25—Never work with a defective tool; return it to the toolroom or show it to your foreman.

26—Never file right handed on the lathe. You are too close to the chuck.

27—Never stand in front of the steam hammer to handle material. Stand at the side and use tongs.

28—Never wear long, loose or baggy sleeves around revolving machinery.

29—Always block the wheels on a car or loose tender before jacking up.

30—Use regular jack handles. Small bars or pieces of pipe are dangerous on account of slipping.

31—Never move an engine before ringing the bell and going around it. Someone may be working on or beneath it.

32—Never make an application of the brakes on an engine without first finding out if anyone is working on it; you may cut off someone's finger.

33—Never uncouple an air hose on cars or between two locomotives without first closing angle-cocks.

34—Never leave draw-bars, couplers, material of any kind or tools where they may be a source of danger by people falling over them.

35—Never carelessly throw down boards with protruding nails. The nails should be bent over, or at least the point turned downward.

36—Don't stand between moving cars to make a coupling, and never use your feet or hands to adjust the coupler; you may lose a foot or hand.

37—When your duty calls you to ride a car for the purpose of receiving and displaying signals, or for operating the hand brake, place yourself in a safe position. Don't ride the brake wheel or sit on the end of the car. Also keep clear of exceptionally high cars unless unavoidable, and then keep a sharp lookout for overpass, bridges, etc.

38—Never lean out of a cab window or ride the side of a car before noting if there is sufficient clearance.

39—Always place reverse gear in central position. Set the brakes and open cylinder cocks before leaving a locomotive.

40—Pile material well and neatly and be positive that it will not fall.

41—Never ride on a journal box, brake rigging, truss rods or other unsafe footing. If your duties call you to ride, use the proper safety appliances.

42—Never enter a room or car containing inflammable material of any description with a lamp. This is dangerous.

43—Always be sure before closing car doors, firebox doors or replacing manhole covers or container covers that no one is inside.

44—Never overload tenders. Falling coal is dangerous and an expensive waste.

45—When passing a station or public thoroughfare, never open cylinder cocks. You may scald someone or scarce horses, with serious results.

46—Pieces of hardened steel or files should never be used for drift pins.

47—Before mounting a ladder see that it is safely secured against slipping.

48—Never ride on a planer bed.

49—Unless your duties so require, don't touch electric wires or apparatus. If it is your duty to do so, be positive you have the correct tools and that they are in good condition.

50—It is dangerous to put your fingers under material to find if drill is coming through.

51—Never attempt to tighten arch tube, washout or other plugs under pressure. Consult foreman.

52—It is dangerous to pass under or near bar material being turned in turret lathe.

53—Keep gears covered; exposing is dangerous.

54—Before you swing a sledge, look around. Someone may be behind you.

55—Keep a handle on your file and never use a file without handle on a lathe.

56—Before jacking an engine, tender or car, place substantial blocking under jack. Also place a block or shim on top of jack to prevent slipping.

57—The steam hammer is not intended for cold iron.

58—Practical jokes are expensive because of time wasted. They have also proved dangerous, therefore "nuff sed."

59—Never strike tempered steel with a hammer or similar object. This is dangerous, as the steel is brittle and liable to fly in someone's eyes.

60—Place a screen properly secured around steam hammer when cutting straps from drawbars, as protection against flying rivets.

61—Keep your closets, tool boxes, cupboards, etc., clean at all times. Remember soiled waste, rubbish, waste paper and the like are fire hazards, besides being untidy.

62—Use trestles when removing a truck from a tender or car. Don't depend upon jacks alone, and always see that you are protected if working beneath cars or engines liable to be moved.

63—Elevators should be enclosed and protected and used only for the purpose intended.

64—Don't attempt to operate your machine and carry on a conversation. If absolutely necessary to talk, stop your machine first.

65—Beware of set screws on revolving shafts. They are dangerous. If within seven feet of the floor they should be countersunk. This applies also if they are near a point where machinery is oiled or adjusted.

66—Unless you have a spare hand, don't reach under planer rollers to remove shavings.

67—All gasoline containers, whether full or empty or partly filled, should be handled with necessary precaution. All torches, lamps, matches and the like should be kept at a distance.

68—Refill or discharge gasoline in the daylight hours when possible, and bring containers out in the light.

69—If a car inspector, don't go near a tank car containing highly inflammable gas or liquids with your oil lamp burning. There may be a leak.

70—Keep the rest on the emery wheel in position.

71—Before drilling any piece of material, be sure that it is properly secured.

72—Keep all metal and conducting material away from the

vicinity of electric switches. Someone may take hold of these and make a circuit.

73—Never feel a drill or reamer when operating same; neither allow anyone else to do so.

74—If a fellow employee or anyone becomes caught in an electrically charged wire or receives a shock from a dynamo or switch, insulate yourself before attempting to release them, using dry clothing, rubber gloves or a cane, and be sure to stand on dry boards or other dry non-conducting materials.

75—Store acetylene gas cylinders separately in a safe place. When transporting by crane or derrick, never use a sling or magnet. Watch the valves carefully and close when work is completed, also see that they are maintained in proper repair.

76—These cylinders are not intended for use as rollers or supports, and should never be so used; also they should never be dropped or permitted to strike each other or other objects violently.

77—Keep oxygen away from oil or grease, as these commodities in the presence of oxygen under pressure may ignite violently, and never use oxygen as a substitute for compressed air as a source of pressure.

78—Never attempt to mix gases in an oxygen cylinder.

79—Don't, under any circumstances, attempt to transfer acetylene from one cylinder to another; nor to mix other gas with it in the cylinder.

80—Report to your foreman all unsafe conditions. Take the safe course. Educate others to do the same.

Safety First!

Plywood Sheathing Saves Steel and Weight

Five-ply fir siding, 5/8 in. in thickness, will be used to replace .10-in. steel sheathing in the construction of 750 box cars now being built for the Canadian Pacific. Before deciding upon this substitution the railroad tested the practicability of the idea by removing the steel sheathing from a 40 ft. 6 in. double-sheathed car and replacing it with plywood. This car was then subjected to severe service tests and met all necessary requirements.

A net saving of 2,063 lb. of steel per car is realized in the replacement of the steel by plywood.

In the experimental car, after the steel sheathing was removed, plywood was applied to the Z-bar posts which formed the car structure after a bar equal in thickness to the Z-bar leg was welded on to form a cover and means for fastening the plywood in place. The plywood siding was bolted in place. The bolts pass through the cover plate, the plywood and the post, using the rivet holes which were already in the posts. The joint between the outside steel cover and the plywood was then sealed with cement.

This double-sheathed car has many advantages over the single-sheathed car of the last war period. The plywood car retains standard dimensions inside, whereas the single-sheathed car loses 1 5/8 in. in width and saves only about 500 lb. of steel. Because of difficulties in obtaining clear lumber in standard lengths the single-sheathed car suffers in comparison, as loose knots, weather checks and splits, and additional joints allow more dust and water to enter the car. In addition to saving more steel the double-sheathed plywood car provides greater protection to vital war shipments.

Locomotive Compressed Air Radiation Unit Redesigned

The grid-sectional locomotive air-compressor radiation units, supplied by the Wilson Engineering Corporation, Chicago, and mounted in pairs for parallel flow, with variable capacity either automatically or manually controlled, originally consisted of composite castings with a center of alloy iron upon which was cast the grid fin structure in aluminum. Strict allocation of aluminum to military uses necessitated substituting other metals and the revised design has been developed and successfully tested.

Double-sheathed car using laminated wood sheathing which releases 2,063 lb. of steel

The new grid section, integrally cast in alloy iron as shown on Fig. 1, is said to be the equal, per linear foot, of the original aluminum fin structure in radiation effectiveness. This might seem inconsistent because of the much higher thermal conductivity of aluminum as compared with iron. The deciding factor in this class of radiation effectiveness, however, has been shown not to lie in actual thermal conductivity of the metal, but in the speed with which the heat units are dispersed to the surrounding atmosphere from the surface of the fins. Any strong movement of air about the radiation units cannot be counted upon because locomotives are usually stopped when the air compressors are working hardest.

Comparative thermal conductivity of the metals, therefore, appears to have little to do with the effectiveness of this radiation provided only that the heat units are carried to the surface as fast as they can be carried away, which by comparative tests has proved to be the case with the revised design of Wilson radiation units.

It is recommended that the new radiation units be securely and strongly supported by the simple arrangement shown in Fig. 2. It will be noted that the sections are supported, for steam-locomotive application, by a single angle bar, which is intended to reach from boiler bracket to boiler bracket as required for support of other structures such as the running board. This makes additional brackets or supports unnecessary. The grid sections are factory tested with hydraulic pressure to 500 lb. per sq. in., two sections in parallel are equivalent to 25 ft. of 1½-in. pipe.

The assembly of two grid sections in pairs allows an interesting range of variability to meet the wide range of atmospheric temperatures. For manual variability a plug cock is inserted at the air entrance to one of the sections, leaving a free and unobstructed passage through the parallel section. The same end is gained automatically by means of a thermostatic valve. The automatic valve, however, is placed in the discharge end of the section to be cut out, because that valve must be actuated by the temperature of the air after passing through the radiation. This latter arrangement is shown on Fig. 2.

Other advantages of this type of radiation, aside from the variability feature, include its compactness and neatness of application; increased accessibility of motion work and air reservoirs as compared with pipe coils which obstruct; space available for practically any desired amount of additional radiation with this type of radiating unit.

The Wilson radiation units are standard equipment on the new 5,400-hp. Diesel-electric freight locomotives and have been installed on steam locomotives by several railroads.

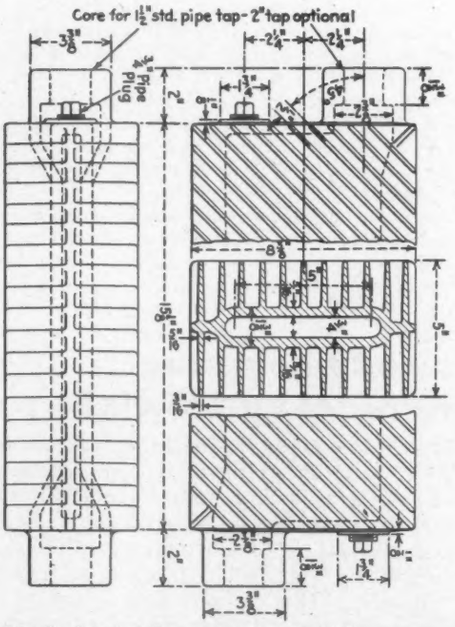


Fig. 1—Detail of integrally cast section of Wilson air compressor radiation unit

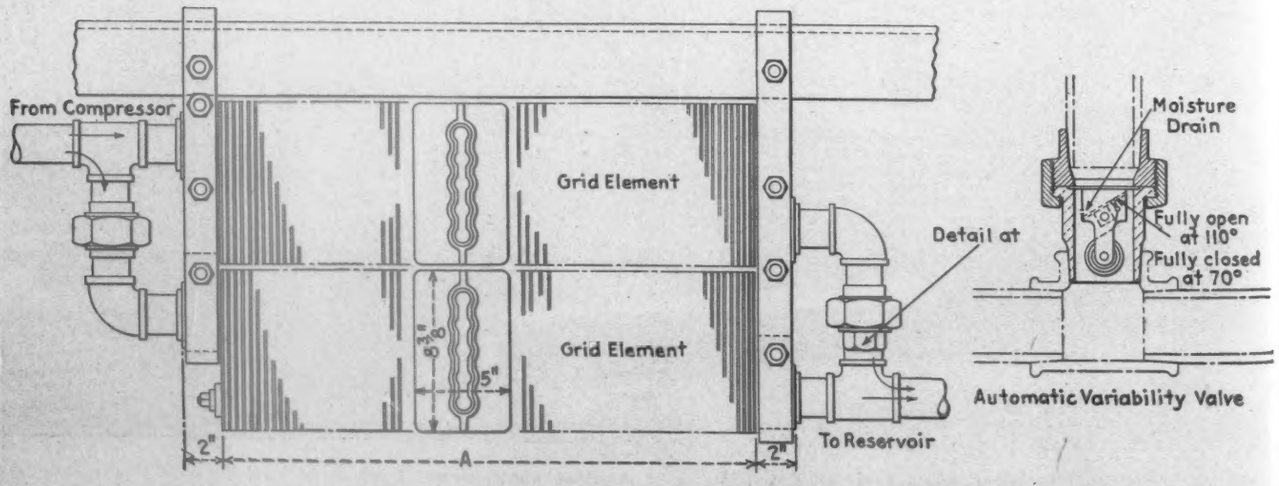


Fig. 2—Schematic drawing of Wilson radiation units showing pipe connections and bracket supports

EDITORIALS

Do You Know Why They Are Idle?

"Already a number of railroads, acting as subcontractors, are using their shop machinery and facilities to manufacture or process parts and materials for shipbuilding companies, construction contractors, ordnance works, chemical and ammunition plants and other plants engaged in the manufacture of direct materials for the government.

"These railroad shops are making or finishing parts for mine sweepers, patrol boats, sub-chasers and mer chant ships. They are turning out parts for naval gur. mounts, airplane-engine mountings and are also doing work on the rolling stock used by the government or by contractors in the construction or operation of munition plants."

The above statement is quoted from a report concerning the things the railroads are doing to help win the war and shows in a tangible way that much of the initial controversy concerning the possibility of doing war work in railroad shops has been cleared away to the extent that results are forthcoming. There still exist some misunderstandings on the part of both government representatives and railroad shop officers and supervisors that can profitably be cleared up.

We have heard recently of cases where government representatives engaged in making a survey of railroad shops looking for potential war production "capacity" have taken a ridiculously short time, in some shops, to arrive at the conclusion that a large part of the machine tools were idle—and therefore available for other work. It might be well to point out that the machine load factor of a railroad shop is almost always lower than that of an industrial plant on production work for the simple reason that a railroad shop of any consequence has a number of special-purpose machines the potential output capacity of which is substantially greater than the maximum volume of work which that shop has for the machines to do.

No man, regardless of his experience or ability, can walk through a shop employing over 1,000 men in less than an hour and say conclusively just how much excess capacity there is in that shop. There is only one way to find out and that is to make a study of at least 168 to 720 hours' duration of every machine in the plant. On the machines on which it is proposed to do outside work it would be well to compile an accurate record of the floor-to-floor time of every job. Then, when someone proposes to put a contract job with a floor-to-floor time of 12 hours on a machine which is idle for only one 8-hour shift there will at least be available the facts as the basis for a discussion as to whose work is more important.

Any railroad shop these days that is without the services of a trained shop or production engineer who knows the answer to the question, "What about these idle machines?" is flirting with trouble because if you don't know the answer someone else will think one up for you. A thorough knowledge of your operations will save you a lot of grief in the days just ahead.

Service Capacity of Locomotives

The Diesel-electric locomotive has built up an enviable record for high availability. Both in the yard and on the road it has in numerous instances demonstrated readiness for service for more than 95 per cent of the time. For road service this is one reason which justifies the purchase of Diesel-electric locomotives even though the first cost per horsepower of rated capacity is materially higher than that of the steam locomotive.

But when the purchase of these locomotives is under consideration, the management of the railroad must assure itself that the locomotives can be operated in a manner such that their utilization will approach the same high percentage of time as their availability. This assurance involves little difficulty in the selected passenger runs on which many Diesels are now operating. In more general assignments, particularly those involving freight service, however, careful studies must be made and close attention given to every detail of the operation in order that there may be no doubt but that the assignment finally adopted will provide sufficient work for the locomotives to do.

No comparable procedure is followed when the purchase of steam locomotives is under consideration. From time immemorial it has been the practice to secure a surplus of power as protection against contingencies. Time was when this practice was justified by the unreliability of the steam locomotive. Improvements in boiler conditions, brought about largely by a better selection of boiler feed water sources and by water treatment, have removed the boiler as the major source of unreliability and have stimulated the development of structural and mechanical improvements which have still further increased steam locomotive reliability.

If the same attention were given to the assignment of steam locomotives that is given to the assignment of Diesel-electric locomotives in road service present standards of steam locomotive utilization would appear waste-

ful in the extreme. However, with an inventory of locomotives only casually related to traffic volume, there has never been sufficient pressure to justify the effort required. Now, with a free supply of new locomotives severely curtailed at the source, the pressure for more utilization of steam locomotives is going to produce results.

How High Is Your Score?

It takes times like these to drive home to many of us how important little things are; what a big part the performance of little tasks plays in the final result. When one contemplates the thousands of detail jobs that are involved in this thing we call railroading it is quite possible that a lot of people aren't thoroughly conscious of the thorough manner in which thousands of railroad men the country over are doing those thousands of detail jobs which, added together, are resulting in some of the outstanding records.

Pick up a tabulation of the operating statistics of your own railroad or of all the railroads, if you choose. On that sheet of figures you will find dozens of familiar terms such as gross ton-miles, train-miles, car-miles or locomotive-miles most of which are somewhat abstract terms to all but a relatively few people in the mechanical department. Why be concerned with things like that for, after all, they are the headaches of the men in the transportation department. We in the mechanical department have troubles of our own. But, it might be well for mechanical men, especially in these times, to look deep enough into some of these headaches, and their background, to discover that there are rarely such things as purely departmental problems in which no one else is involved. The problems of all departments are what make the problems of a railroad.

Let's go back to that sheet of statistics again and pick one out—"miles per locomotive day," just for example. Every railroader knows what that is. It is the average number of miles that the locomotives of your road run each day. Looking back over the record you may find that way back in 1929, in the "good old days" before the depression, your road's freight locomotives averaged 65 miles a day. Ten years later they were doing just as well—65 miles a day. But—last October you find that average had jumped to 100 miles a day and in April of this year it is 115 miles a day and still going up. To the mechanical-department man who is looking for a new kind of reading matter we'd like to suggest that the freight operating statistics of your own railroad and its neighboring competitors contain some of the most fascinating stories of modern railroading, and what's more interesting, they're stories about you and the men you work with.

Maybe you think that's a hard one to prove. Well, let's go right back to one little thing—"miles per locomotive day" and see what it has to do with you. Your locomotives are the most valuable things the company owns just now; valuable because they are so badly needed to haul that thousand tons of vital war materials that are waiting out there in the yard. A locomotive isn't worth a nickel to any road unless it is out on the road hauling freight. And yet most active locomotives —steam locomotives at least—ordinarily spend more of their time off the road than on; either at an engine terminal being serviced or repaired, or awaiting call. No locomotive can increase its daily average mileage standing around an engine terminal. So, as far as the mechanical department is concerned the object of this little game is to get locomotives out of our hands just as quickly as possible, and in the best possible condition.

Not long ago a committee of one of our associations made a study, over a period of 48 hours, of the daily life of one railroad's active locomotives and a summary of part of the findings might be interpreted like this:

	Percentage of total time		
	Freight	Pas-senger	Switch-ing
A—On the road, earning money and doing war work	33.2	31.9	46.4
B—In the enginehouse for servicing and repairs	30.4	29.9	20.1
C—Waiting for something to do	36.4	38.2	33.5

It might be a good idea if a "scoreboard" like this were posted in every enginehouse in the country so that every man that walked by it could take a good look once a day and "see what the score is." It might also be worth while to put up one of those Community Chest campaign thermometers on which the road's daily average locomotive mileage figures were posted each month so the men could see how things were going. Right away someone is going to ask "What good will all this do?" That is where you and the importance of little things come into the picture.

Of the three periods in the daily life of an active locomotive—A, B and C in the summary above—there is really only one, B (in the enginehouse for servicing and repairs) about which the mechanical department can do very much directly but what we do about B has a very decided influence on A and C. Let's suppose, for example, that when a locomotive is in the A class it is in the hands of the train despatcher; that when it is in the B class it is in the hands of the enginehouse foreman and when it is in the C class it's really a reflection of general motive-power policy—that is, the management's worry. The manner in which the game is played is for the enginehouse foreman to get all his power into Class C as quickly as possible. If locomotives stay around too long in Class C (thereby running up the percentage) it is always possible to "put 'em in whitelead." The nice thing about this game, when the score is posted where everyone can see it, is that it gives everyone concerned a chance to do something they like best of all to do—to pass the buck to the other fellow. All the enginehouse man has to do is to think up every trick known to the trade to move every locomotive from the inbound pit to the outbound ready track in the short-

est possible time and then pass the buck to the despatcher. When this has been done for two or three months take a look at the scoreboard; Class B goes down and Class A goes up. What happens to Class C depends on the volume of business and power policy.

There are many little tricks that will help an enginehouse man cut the percentage in Class B. Take inspection, for example, for checking heights of brake rigging, pilots, and things like that above the rail. How do you do it? At one enginehouse we saw a simple electrical device on the inbound end of the ash pit that lights a red light and rings a bell in the inspectors' shanty if anything on the locomotive passing over the device is lower than the prescribed limit. Another little stunt for checking steam leaks, also near the inspection pit, made it possible to do the job in seconds instead of minutes. Well arranged ash, coal and water facilities make it possible to get them over the table and into the house in remarkably short time. We don't have to go into detail about the value of good tools, good organization and good men in cutting down the time required for repairs. Modern lubrication systems and modern high-pressure grease guns cut down the time for doing that most important job.

These are the thousand-and-one little jobs which, in themselves, all add up on the scoreboard. If you mechanical men will just use your native ingenuity there are many ways in which you can get locomotives through the house in a lot less time than it takes now. If you do your job and make it possible "to keep 'em rolling" you'll be surprised to see the percentage of time in the enginehouse go down and the miles per day go up.

And—here's a little hint to the management. If a notice offering a prize for any idea that will get locomotives through shop or enginehouse faster is posted alongside the scoreboard maybe even the "brass hats" will be surprised when they look at the board.

What About Supervisors?

The Division of Transport Personnel of the Office of Defense Transportation has estimated that, before 1943, the railroads will have added at least 320,000 new workers to their forces. The problems involved in recruiting this personnel were fully covered in the Freight Progress Issue of the Railway Age by Otto S. Beyer, the director of the division. It is not too late to point out that Mr. Beyer concerned himself only with the questions of how many new employees would be needed and what labor sources could be tapped to obtain them. The railroads themselves must face and find a solution to another closely related problem—finding enough qualified supervisors to assure the maximum return for each labor dollar spent.

Up-graded helpers and laborers, short-term apprentices, reassigned mechanics and new workers all need help in adjusting themselves to new tasks. They have a right to the benefit of advice, assistance and correction from a superior who is not so loaded down with responsibilities that no time can be found to direct operations properly. Studies have shown that work spoilage, errors and accidents occur in almost direct ratio to the supervisory personnel where mechanical operations are involved. This is true even when most of the workers are reasonably skilled; it should be seriously considered in cases where workers are new to their jobs.

An overworked supervisor is necessarily a poor one because he finds it impossible to keep track of everything for which he is responsible. Very often an overworked supervisor is not respected by his men because they fail to understand why he can find no time to answer questions or spend sufficient time on a difficult job to work it through to the end. An overworked supervisor is an added expense to his employer because spoiled work, accidents, lax discipline and general slackness among shop personnel cost money and delay shop output.

For many years we have directed attention to the plight of the average enginehouse foreman and his twelve-hour day. With the present intensive use of motive power, shorter turn-arounds and less time in the engine terminals for locomotives, the pressure on these men is still further increased. Shorter working days may not be the immediate answer but more assistant foremen can be assigned to insure proper performance of all required repairs and a full return on each labor dollar spent.

Locomotive and car shops are, in many instances, undermanned in the same manner as are the enginehouses. Generally the hours of work are a little shorter but the pressure of work is no less heavy. No accurate figures are available to indicate the true ratio between workmen and supervisors, but instances will be frequent where, if a thorough job study was undertaken, it will be found that men are being called upon to do a great deal more than time will permit to be performed efficiently.

It is the supervisor "on the job" that counts, not one who spends time in an office with only an occasional glimpse of the inside of the shop and a fleeting contact with the men and the work which are his responsibilities.

In the aircraft industry it is estimated that one supervisor is required for each eight employees engaged in production work. Railroads may not, probably do not, require any such proportion of supervisory personnel. However, if they are to continue their fine record in the maintenance of equipment with an influx of new employees, added to those already employed who are not fully conversant with the requirements of their jobs, the railroads must for their own benefit give relief to already overburdened supervisory forces by adding enough additional leaders, assistant foremen and foremen so that work will be properly done, shop output maintained and the accident records held at the lowest possible figure.

Carloads of Trouble

By
Walt Wyre

DICK WHEELER, car foreman for the S. P. & W. at Plainville, was right in the big middle of a quandary stuck on a dilemma between the devil and deep blue sea, and also in the eight by ten shack that had served as a coalhouse until a gas burner was installed in the roundhouse blacksmith forge, then converted into an office for the car foreman. The thing that had Dick Wheeler bothered was a traingram from the superintendent saying that six carbon black cars must be forthcoming each and every day until further notice. Three per day had been the previous quota and he hadn't made that. If he hadn't known it, there was a traingram on his desk reminding him in no uncertain terms. There was also a traingram from the master mechanic saying that the two additional carmen and helpers requested could not be furnished because there were none available.

Wheeler rose from the desk and walked to a window and looked out at the rip track full and overflowing with cars, each with a bad-order card and each badly needed. He walked to the door and looked out, but the view wasn't any better. All he could see was a string of box cars waiting to be prepared for hauling the creepy, crawly black powder that is used in rubber tires to make them wear longer and dozens of other purposes. Each one of those cars had to be caulked and smoothed, lined with cardboard until there wasn't a single nail or splinter to tear the paper bags containing carbon-black or a tiny crevice for the stuff to sift through. One of the cars had a short ladder at the door indicating that some one was inside the car working, or at least had been.

Eleven carmen, six helpers, and four laborers, a write-up man, and the foreman constitutes the personnel of the Plainville car department. H. H. Carter, the master mechanic, had called Dick Wheeler's attention to that fact the day before when Wheeler had told the master mechanic that additional men would be required if six carbon-black cars were to be turned out besides the other work.

"Three of the carmen are inspectors, one is locomotive carpenter in the roundhouse, and Bill Jackson is busy in the mill all the time. Half of the time Bill is making cabinets or repairing furniture for the offices," Wheeler added. "That just leaves five carmen working on the rip."

"Well, we can't get any more carmen," Carter said, "and six carbon-black cars is what the superintendent ordered."

While Wheeler was standing in the door, Ray Anderson, the master mechanic's clerk came up. "What's the matter?" Ray asked. "Somebody take your lolly-pop?"

"Wish I was of draft age," Wheeler said. "I'd join the army."

"Yeah, that's what they all say that are exempt. But speaking of preparedness, when are you going to have Bill Jackson take down the screens and put up the storm doors on the office? What do you say we break the good old American rule of waiting until the next minute after the last!"

"I'll tell Bill to get on them soon as he has a little time," the car foreman conceded.

After the clerk left, Wheeler made the rounds of the rip to see if there wasn't one more carman that could be put on the carbon-black cars, knowing at the same time chances were slim. There were only four carmen and that many helpers that might possibly be put on the carbon-black cars and all were busy as a Brooklyn bartender the night the "bums" won the game in the "world's serious." Two of the carmen were working on a foreign car loaded with perishable stuff. The car had to be ready that night. One carman, and a helper, were changing two pairs of wheels, one pair on each truck of a baggage car; the other was cleaning and testing air equipment.

Wheeler passed the loaded reefer, then turned and walked back to where the men were working. "How long will it take to finish?" he asked.

"Oh, about three hours," one of the carmen replied.

"Well, all of you go over on the carbon-black cars and work until quitting time, then finish this one after five o'clock. Don't pile up any more overtime than you have to," Wheeler added.

That day six carbon-black cars were O. K.'d and twelve hours overtime charged to the foreign reefer.

Next morning when Wheeler came to work, he found the rip track in fairly good shape. He could put two men on carbon-blacks before noon and perhaps two more in the afternoon.

HE had things lined up and going good when the dispatcher called. "Get the wrecker ready to leave at once! Engine and five cars on the ground about three miles this side of Middleton," the dispatcher said.

The wrecker took two carmen, three helpers, and two laborers from the car department.

The wreck gave Wheeler a plausible excuse for not getting out his quota of carbon-black cars that day and the next; but besides an extra accumulation of work on the rip track while the carmen were cleaning up the wreck, four damaged cars from the wreck were brought to Plainville to be repaired.

Nine carbon-blacks finished, a bawling out from the super for not getting more, and circles under his eyes from loss of sleep occasioned by the wreck was the net result by Wheeler that week. He swore to get out six carbon-black cars per day next week if he had to let everything else go.

Monday morning started off for the car foreman like a breakfast food advertisement. A carman had unexpectedly shown up to go to work and there was a brand new air operated portable sanding machine; then when Wheeler asked the storekeeper about cardboard and glue for papering the carbon-black cars, the storekeeper replied there was plenty of both in a car waiting to be unloaded. A new machine to speed up the work, plenty of material, and a man to use them! Dick Wheeler was almost ready to believe the emergency was over, despite headlines in the morning paper saying that more men and material were needed by Britain.

Wheeler showed the new man how all of the cracks,

even the tiniest ones in the floor, were to be filled, nails driven down and rough places smoothed with the sanding machine. Then he showed him how the walls were to be surfaced and cardboard glued on.

"They are more particular than flour cars," the new carman observed.

"That's right," Wheeler agreed, "and if they are not just right the carbon-black people won't take them."

Everything was going along smooth as a well shaped leg in Nylon stockings—we're saving the silk for powder bags and parachutes—when about ten o'clock the new sanding machine slowed down, gasped, and stopped. The air hose went limp. The carman swore and climbed down out of the car to see who had turned off the air.

He tried the valve and found it to be still open. He tried another valve and there wasn't any air there either. He found the car foreman and told him there wasn't any air.

"Maybe the air compressor at the roundhouse stopped," Wheeler told him. "That happens sometimes. If it doesn't come on soon, let me know and I'll see about it."

"It would be mighty slow work smoothing the inside of them cars by hand," the carman said.

"Yes, we've been getting along with just one machine. I sure was glad to get another one," Wheeler said. "You might as well go ahead filling cracks and getting another car ready while waiting for the air to come on," he added.

At eleven-thirty the car foreman went to see how the men were getting along with the carbon-blacks. The foreman found four cars ready for surfacing and the air still off. He headed for the roundhouse like a soldier going to mail call. About half way to the roundhouse Wheeler saw a water service man working on a pipe line. He was using a torch cutting an old line of two-inch pipe into lengths that would be convenient to handle.

Wheeler paused a moment. "Putting in a new line to the car department?" he inquired.

"Yes, this one is pretty well shot"—the water service man raised his goggles up on his forehead—"it was leaking all along," he added.

"Yeah," Wheeler started to leave, "I've noticed the water was rusty several times," he observed.

"This is an air line," the water service man said as he pulled his goggles down over his eyes.

"What!"—Wheeler turned around—"Is that the air line to the car department?"

"Yep!" The water service man held the torch close to the pipe and prepared to make a cut.

"That's why we haven't got any air!" Wheeler exploded. "How long will it be before you'll have the new line in?"

"About three days." The water service man pressed the oxygen valve and held it down until the flame had eaten through the pipe.

"But we've got to have air," Wheeler remonstrated. "Why didn't you tell me you were going to cut the air off?" he asked.

The water service man shut off the torch, lifted his goggles, and looked up. "You can't get air without a pipe line," the water service man said. "I thought you had asked for a new line."

"I had, but I can't think of a less convenient time to shut off the air to put in a new line," Wheeler complained. "Besides, why couldn't you run the new line before you cut the old one?"

"Never thought of that," the water service man rubbed his chin reflectively. "I'll renew what pipe I've got cut out and connect it up so you can have air while I'm running the rest of the line," the water service man agreed.

"How long will it be before I can get air?" Wheeler asked.

"Maybe late this afternoon," the water service man replied.

Wheeler groaned and went back to the car department.

Working without the sanding machine was something like climbing a treadmill, lots of exercise with little to show for it. The car foreman decided to put all carmen to work cleaning up other work on the rip, then put all hands and the cook, if there had been a cook, on carbon-blacks as soon as the water service man connected the air line.

It was after four o'clock when the water service man told the car foreman that he could get air, too late to do much on carbon-blacks that day, but the repair track was pretty well cleaned up and he would give them hell tomorrow.

Wheeler went to work early that morning. The rip had been switched during the night. All of the O. K.'d cars had been pulled out and he noted with satisfaction the few bad orders that had been set in. Prospects for a good day on carbon-blacks looked promising.

The car foreman sat down at his desk and started going through the morning mail. He found the usual and expected reminder about carbon-black cars and little else to worry about until he picked up the last yellow slip at the bottom of the pile. It was a traingram from the superintendent saying that a conductor and trainmen were complaining about condition of caboose, particularly rough riding. "These conditions must be corrected immediately. It should not be necessary to call attention to the fact that cold weather may be expected soon and all cabooses should have windows and doors weather-stripped and otherwise placed in condition for winter service. This work must be done at once."

Wheeler grimaced like a man eating beans that had bit down on a rock. He knew by past experience that the trainmen would not be patient and there was only one thing to do, put at least one carman and helper to work on the cabooses, which meant two men less for work on the carbon-blacks.

Eight cars were O. K.'d for carbon-black service that day, but little was accomplished on other work. Besides, the air being off one day and cabooses to be worked, other minor incidents interfered with work on the carbon-black cars that week. Among other things, a streamlined passenger coach with four slid flat wheels and defective air was set out by the Limited to be repaired. There was some more overtime to explain that day. Saturday morning Wheeler was looking over the records, not that he needed any record to know just how many carbon-black cars had been turned out that week—sixteen up to then and prospects of no more than four that day. The superintendent would go so high he would need a parachute to come down. There were plenty of excuses to offer for not getting the cars out, but the super didn't like excuses. "Can't use them to haul loads," the official would say as he had often said.

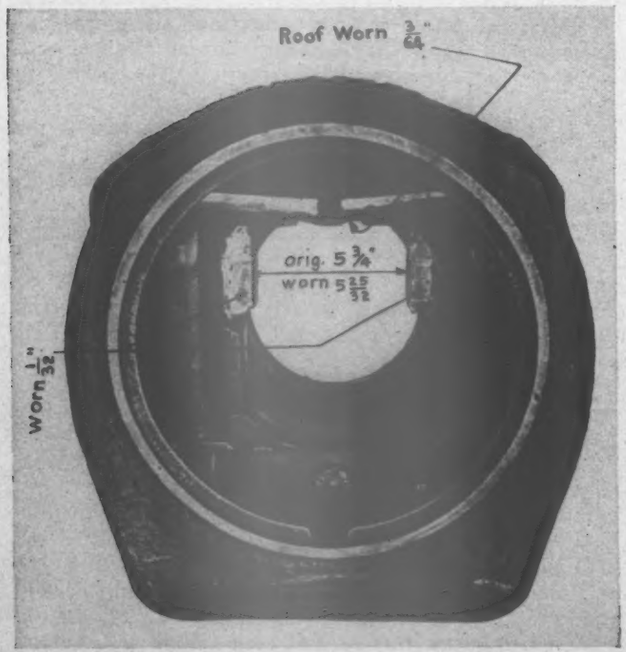
While Wheeler was sitting in the office getting dandruff under his fingernails scratching his head, the telephone rang. It was the chief despatcher's clerk calling. "There are seven cars at the Plains Milling Company that are not needed right now," the clerk said. "They've been setting some time, better look them over and we'll pick them up for other use."

(*Continued on page 350*)

Long-Life Journal Box

The Isothermos journal box manufactured by the National Malleable and Steel Castings Company, Cleveland, Ohio,* has established a service life of one million miles under a baggage car operated in high-speed service. During this period of service a journal bearing life of over 350,000 miles per bearing was obtained and when the boxes were removed they themselves were checked and measured for wear. The exterior view of one of the boxes removed shows the original dimensions and the extent of wear; the other shows wear on the interior of the box.

Condition of exterior of Isothermos self-lubricating journal box after a million miles in service



Interior wear on an isothermos journal box after a million miles of service

*For a description of this box and other performance records see the *Railway Mechanical Engineer*, March, 1941, page 103.

Air Brake Questions and Answers

HSC High-Speed Passenger Brake Equipment

51—*Q.—When is this valve open and closed?* A.—Open when coils are de-energized, closed when coils are energized.

52—*Q.—What is the duty of the application valve?* A.—To open or close communication between auxiliary reservoir and straight air pipe.

53—*Q.—When is this valve open and closed?* A.—Open when coils are energized, closed coils are de-energized.

54—*Q.—Explain the operation of both valves.* A.—When coils are de-energized, spring (*35*) unseats release valve, opening straight air pipe to exhaust and a second spring (*35*), seats application valve, closing communication between auxiliary reservoir and straight air pipe. When coils are energized, their armatures pull stems (*27*) down, seating release valve, closing communication between straight air pipe and exhaust, and unseating the application valve, opening communication between auxiliary reservoir and straight air pipe.

55—*Q.—How are the coils energized?* A.—From the application and release wires as controlled from the master controller.

56—*Q.—What protection is given against the loss of auxiliary reservoir air in the event of abnormal magnet valve operation or broken straight air pipe?* A.—A cut-off portion.

57—*Q.—What does this portion consist of?* A.—A diaphragm (*6*), a valve (*5*), spring (*10*), and spring (*17*).

58—*Q.—Describe the operation of the cut-off portion.* Diaphragm *6* controls the position of the valve *5* located in the supply passage from the auxiliary reservoir to the application magnet. Spring *10* having an approximate value of 75 lb. acts on the diaphragm against the auxiliary reservoir pressure under the diaphragm. When the auxiliary reservoir pressure exceeds the spring value, the diaphragm is deflected upward, permitting spring *17* to hold valve *5* off its seat, permitting flow to the application magnet.

59—*Q.—What happens in event of straight-air pipe leakage causing loss of auxiliary reservoir pressure?* A.—The 75 lb. spring will deflect the diaphragm and seat the valve closing the auxiliary reservoir supply.

60—*Q.—What does this operation provide for?* A.—Sufficient auxiliary reservoir air is retained to provide an adequate automatic brake application.

The FS-1864 Relay Valve

61—*Q.—What does the FS-1864 relay valve consist of?* A.—Referring to Fig. 5 the relay valve consists of the relay portion *10* inshot valve portion *80* and magnet bracket *120*, these portions being bolted to the pipe

bracket from which they are removable for cleaning and inspection without breaking the pipe connections.

62—*Q.—How are the pipe connections on the pipe bracket designated?* A.—Pipe connection *6* to the main reservoir pipe; *16* to control valve pipe; *30* to the brake cylinder pipe. (See Fig. 15. also.)

63—*Q.—How is the relay portion constructed?* (*See Section B-B, Fig. 5.*) A.—Similar to that of the B-3 relay valve except that a large diaphragm *38* is fitted to the piston being assembled to the piston by followers *39* and *40* and retained between the body casting and diaphragm ring *71* so that the tension of release spring *42* is exerted on the diaphragm.

64—*Q.—Is this the only diaphragm?* A.—No; there are three additional diaphragms *68, 64* and *60* assembled on a central bolt between followers and a pusher plate.

65—*Q.—Are these diaphragms of the same area?* A.—No; they are all of different areas.

66—*Q.—How do they compare with the large diaphragm 38?* A.—They have areas of 80, 60 and 40 per cent with respect to the area of the large diaphragm.

67—*Q.—How are these diaphragms arranged in relation to each other?* A.—The diaphragms are located centrally in the body between the four rings which are dowelled to each other so that the diaphragms form a stack in which the central bolt engages the nut *40* in the large diaphragm assembly, through which the spring *42* exerts its release tension on the complete stack.

68—*Q.—What provision is made to release the air from the chamber formed between the diaphragms?* A.—Intermediate and large diaphragm rings *71, 63* and *67* are drilled for port connections to these chambers. Three check valves *51* weighted by springs *52* are located in the passages to the diaphragm chambers which provide for a direct release of air from the chambers.

Device for Centering Car Axles

A convenient and accurate device for re-centering car axles is shown in the illustration. It consists of a No. 9 Thor air motor, applied by a bracket to the tail stock of an axle lathe and arranged to drive the dead center spindle in which is inserted a counterbore. The spindle is fed by the hand wheel. In operation the chuck is used to center the end of the axle accurately with respect to the collar and hold it while the center is being drilled and counterbored. The ⅜-in. relief drill and one of the counterbores are shown in a drip pan which rests on the ways of the machine.

Air-motor-driven counterbore applied to the tail stock of a lathe for recentering car axles

Inspect Air-Conditioning Equipment Daily*

By E. F. Davis

The New York Central follows more or less the same practice as all other roads in making classified or periodic inspections of air-conditioning equipment, weekly, semi-monthly and monthly—which are done as required, and I do not think it is necessary to go into the details of these inspections. However, a more thorough *daily* inspection will go far to prevent costly equipment failures and repairs. It is our opinion that, as most electrical defects are of a progressive nature, in many instances we are able to correct various cases of trouble

* Excerpts from a short paper presented at the May 19 meeting of the Car Department Association of St. Louis by E. F. Davis, electrical foreman, New York Central.

that could result in serious damage between classified inspection periods.

Daily Inspection Form

As a guide for this method of daily inspection, a form has been devised and used in the Big Four area during the past year with gratifying results. This form is headed up to show type of equipment, date and class of inspection given, car number and point where inspection is made, record of train in which car arrives and departs. All essential parts of equipment are named on this form and, as the workman makes his inspection of the equipment, he checks off each item at the car; there are 79 points to check on the daily inspection which may vary due to the different types of equipment, or summer or winter service, as the case may be. When the inspection is completed, the workman signs the form and turns it over to the electrical foreman to be checked and placed on file for record and reference.

Following is the detailed procedure in the use of this form:

Examine the "Report and Defect" card, which is carried in a receptacle inside the control locker door, and repair such parts, or correct defects, that may have occurred en route.

Start the blower fan to ascertain if it runs quietly; then pass through the car and make certain that the air flow is normal. If the blower fan is noisy or, if abnormal flow of air is noticed, the cause thereof should be corrected.

Examine the fresh air intakes and filters, and make sure they are fully open and free from any obstruction or dirt.

Examine the heating system valves and adjust any that may be sticking in "On," "Intermediate," or "Off" position.

The vapor control panel front should be removed and all parts of the panel mechanism carefully checked. Relay contacts must be cleaned with a piece of coarse canvas when found in need of cleaning; sand paper, emery cloth, files and such other coarse abrasives must not be used under any circumstances.

Check the cooling, heating and blower fan thermostat tubes. In testing the thermostatic control equipment, the workman must keep in mind that the object of his test is to see if the various mechanisms, such as steam valves, compressor and associated equipment such as relays, etc., will respond to the respective change in temperature of the air around the thermostat; this change in temperature will cause the mercury column inside the thermostat tube to rise or fall, thus closing or opening the electrical contact through it and which, in turn, operates a relay that controls the steam valve or compressor as the case may be.

Make a visual inspection of the evaporator and its parts, expansion valves, drip pan, drain pipe, and flexible duct connections.

Check the compressor and compressor motor interior, and condenser for any visible defects; check Freon level at receiver tank, also, piping, valves and fittings for any indications of Freon leaks.

Make certain that all V-belts are of approximately the same tension and are in proper place. Due to the present rubber shortage, the conservation of belting is of the utmost importance.

Examine the compressor control panel, check all relays and contacts, also, fuses or circuit breakers.

Inspect the batteries as to general condition and water level. Take specific gravity for a check on operation of generator equipment.

Inspect the generator axle and nose suspension and shear ring, or the driven unit, drive shaft and clutch as the case may be.

Open up the generator, inspect the brushes and interior; also, reversing mechanism.

Inspect generator and lamp regulators; examine all contacts and relays of same.

All wiring must be free from grounds; slight grounds, that heretofore were of no consequence insofar as lighting equipment was concerned, interfere seriously with the control circuits.

It may be said by many in the electrical field that this procedure is too extensive for a daily inspection, but it has been our experience in the past year that it has brought results not only in cutting down failures but in conserving materials. Due to priorities and shortage of raw materials, we feel that there is no better time to abide by the old adage, "An ounce of prevention is worth a pound of cure."

Be thorough in your inspection with a view to conserving vital electrical materials so essential to National Defense.

Carloads Of Trouble

(*Continued from page 347*)

"O. K.," Wheeler said, hung up the receiver and left the office. He started to find a helper and tell him to take a bucket of packing, go over to the flour mill track and see that all boxes were in condition, but changed his mind and headed towards the mill.

The seven cars had been repaired at Middleton, O. K.'d for flour, and sent to Plainville. The foreman walked around the cars. He opened the door of each car and looked in. All of them were in good condition but not so good that an experienced inspector looking closely couldn't find one or more defects on each of them.

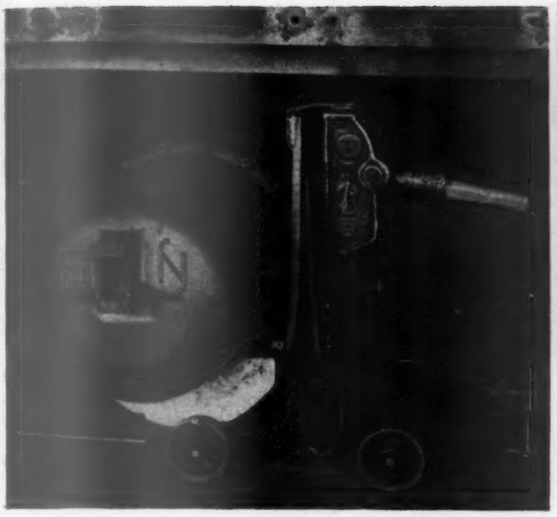
Wheeler walked over to the inspector's shanty and found the first trick inspector waiting for a drag that was expected in about an hour. "Go over to the mill track and inspect the seven cars on the east end of the track," Wheeler said. "If you look close enough I believe you can find enough defects to put a bad order card on each of them." He then went back to his office and called the yardmaster. "There are seven cars at the flour mill to be set in on the rip track. Wish you would get them soon as possible," Wheeler told the yardmaster.

The seven cars were shoved in on the rip track just before noon. At one o'clock Wheeler told a carman and helper to look them over and do just as little work on them as possible to make them ready for carbon-black loading. He also told a helper to look the boxes over and see that all packing was in good condition.

Just before quitting time Wheeler called the superintendent and told him that twenty-eight carbon-black cars had been turned out that week despite several delays.

"Well, you're doing a little better," the superintendent replied, "but not good enough. I want thirty-six next week and no alibis."

The car foreman placed the telephone receiver on the hook and sat there at least five minutes wondering about two things—how in thunder could he hope to do any better next week or even as well unless there were some more flour cars, and what was going to happen when they started yelling for flour cars and found them hauling carbon-black!



Left: A jack, with small wheels, arranged for raising and lowering AB brake cylinders underneath the car—*Above:* A pair of air jacks, equipped with safety valves, for raising and lowering cars—The jacks are moved about and spotted by the light two-wheel carriage, of welded pipe, with lugs to engage the cylinder and roller-bearing wheels—*Below:* Another type of air jack equipped with its own carrying wheels

Great Northern Car Shop Devices

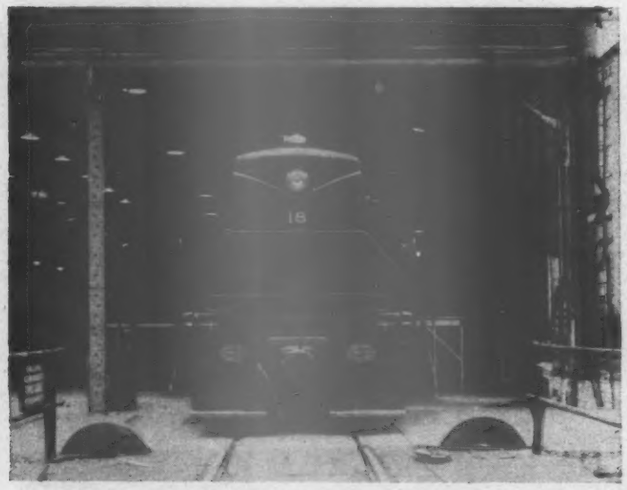
Left: One man can easily remove old couplers and apply repaired couplers, including the draft key, to 10 cars a day with the crane made of welded pipe with light roller-bearing wheels and a hand winch—To the right of the crane is a mobile draft-gear jack, mounted on light roller-bearing wheels—*Right:* Another method of applying AB brake cylinders—a two-wheel truck with a holding bracket to support the cylinder and reservoir—Its upturned handles enable one man to place and hold the cylinder while it is being bolted.

L. & N. Equips

Diesel Repair Shop

Installs all facilities needed for prompt and convenient handling of periodic inspections and necessary maintenance work

THE Louisville & Nashville operates a total of 14 Diesel-electric switching locomotives, including five Electro-Motive 600-hp., five Alco-G. E. 660-hp. and four Baldwin 660-hp. units. Two of these locomotives have been in service over 33 months. These Diesel switchers are used at Louisville, Ky., in train-yard and industrial-plant service. They are operated on a three-shift basis, and are held out of service one shift each month for federal inspection as well as any necessary maintenance.

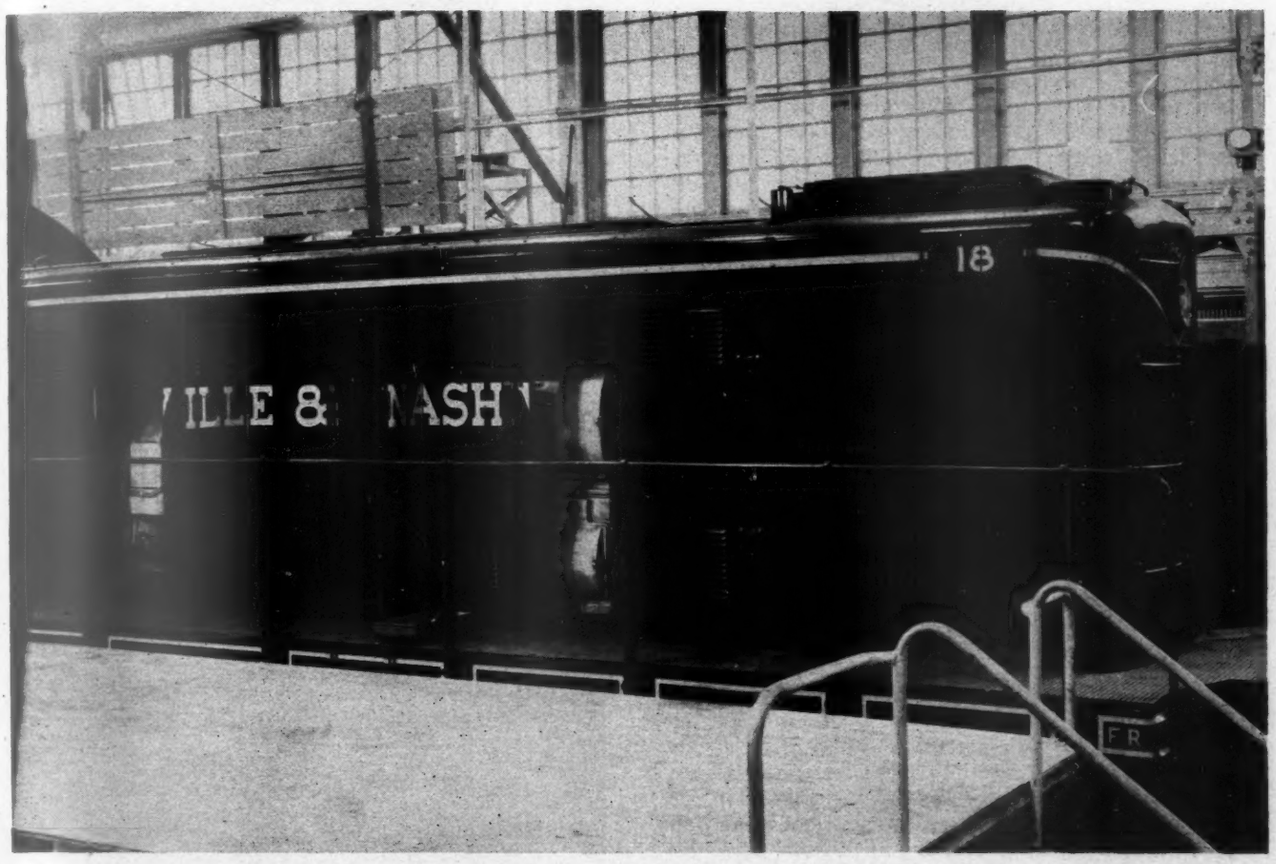


A locomotive coming out of the new Diesel shop

To assure uniformly satisfactory service, the locomotives are given daily inspection in the yards during the crew's 20-min. lunch period. An automotive-type panel truck has been fitted up with necessary filters and a supply of oil and grease and is manned by a mechanic and helper who see that all locomotive parts are suitably lubricated. Fuel oil and sand are supplied by means of four portable fuel and sand stations located at strategic points in the yard. Fuel is taken about every third day with minimum interference in the work of the locomotives which show a high percentage availability and utilization.

Once every 12 months the locomotives are given an annual inspection and testing and the desirability of shopping the locomotives for heavy maintenance and general repairs on about a 4-yr. period called attention to the need for suitable facilities for handling this work. Early this year, therefore, the L. & N. set aside two bays in one of its freight-shop buildings at So. Louisville,

Alco-G. E. Diesel-electric switcher on the transfer table outside the South Louisville shops



Center work platform in the foreground and side drop platform in the upper background

Ky., partitioned off a two-track section roughly 44 ft. wide by 140 ft. long and provided modern heating, lighting and ventilating facilities. Wheel pits and working platforms at two elevations above the floor have been installed together with all special equipment and tools required for the suitable handling of Diesel locomotive repairs.

The two tracks are spaced 20 ft. on centers and the wheel pits and working platforms occupy a length of 50 ft., approximately 19 ft. back from the entrance doors. The wheel pits are 4 ft. deep and there are heavy jacking blocks outside the rails at the four corners. The level of the shop floor is made about 20 in. below the rail top so as to facilitate inspecting trucks from the outside, easily changing brake shoes and hangers, checking wheels and journal boxes, etc. The wheel-pit depth is set at 4 ft., which is the average most convenient for a large majority of the operations which have to be performed under the locomotive.

Center and side working platforms elevated 4 ft. 4 in. above the rail tops, give easy access to the locomotive running boards by stepping across a 12-in. clearance space. Fixed working platforms 8 ft. wide on one side of the shop and 5 ft. wide on the other are suspended from the shop ceiling. They are placed at an elevation to correspond with the top of the Diesel-electric locomotives. A counterweighted drop extension platform, 4 ft. wide by 15 ft. long, on either side extends the elevated working platform when desired to the narrowed top of the locomotive for easy handling of overhead work.

All necessary tools are provided at the various working levels, and around the walls of the rest of the shop are located a 3-ft. by 10-ft. air-filter cleaning tank, an air-filter draining tank of the same size, a 5-ft. by 8-ft.

Covers removed for inspection of the valve rockers and injector nozzles of an Alco-G. E. locomotive

centrifugal oil purifier, a main electric switch box with 6-ft. by 10-ft. space for battery-charging apparatus suspended 15 ft. above the shop floor, a small engine lathe, drill press, pedestal grinder, 9-ft. by 3-ft. work bench and a tool rack or cabinet. Another work bench, 3 ft. by 10 ft., is provided in the center of the shop, and there is a lye vat tank of substantial size with an open-side rinsing and draining pan. The closed end of the shop is

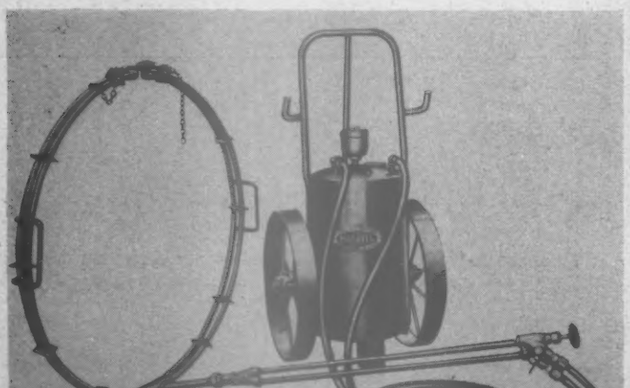
occupied by material storage and there are also lockers and shelves.

When Diesel locomotives, received at the shop for repairs, require wheel or truck changes, they are moved across the transfer table to the locomotive shop where the trucks are removed and replaced by dummy trucks, all other work on the locomotives being performed in the Diesel shop. The only crane facilities provided in the Diesel shop consist of a 15-ft. jib crane equipped with a 1½-ton chain hoist. This is high enough to swing over the tops of locomotives on both tracks. It saves hand lifts of heavy tools and engine parts which are near the limit for manual handling and, of course, the crane is indispensable for moving still heavier materials within its capacity. The jib crane is mounted on a 6-in. post near the center of the center platform. The shop is equipped with air, water and steam lines, and has a welding circuit with convenient outlets.

Work done at the yearly inspection, or after 8,000 hours of service, on one class of locomotives, includes the following: Clean carbon and grind valves; rings are changed every other year, or after 16,000 hours of service; return nozzles to manufacturer for adjustment and inspection; check liner wear and give limit if heads are removed; check male fit on cylinder heads with surface plate; general inspection of all parts removed; clean engine thoroughly inside; inspect and clean generator and auxiliary motors; check and clean all electric control equipment; apply high potential test to electric-control equipment (I. C. C. requirement); test main reservoir (I. C. C.); check air compressor and make orifice test (I. C. C.); turn wheels if necessary; remove and clean traction motors when wheels are turned and check bearings for wear and end play; take up slack in throttle and governor linkage installing new bushings and pins as necessary.

Safety Vacuum Type Heating Units

Heating of locomotive tires is readily and safely accomplished by the use of a safety vacuum-type heater placed on the market by the Mahr Manufacturing Company, Minneapolis, Minn. Adjustable rings which distribute heat evenly on the tire surface are attached by a union connection and nipple to the torch which has valves connected to oil and compressed-air supply lines. Opening a valve on the air line which releases air through the burner nozzle creates a vacuum on the oil supply tank when the fuel valve is open. Oil is drawn into the compressed-air stream and atomized, the spray from the nozzle being ignited by waste which is placed between the tire and rings and lighted. The flame can be controlled by the adjustment of the air and oil valves. The important safety feature of the heater is the fact that the fuel supply tank is never under pressure and in danger of exploding.



Safety vacuum-type heating unit with adjustable rings

The same tank and supply line can be used with other type burner nozzles for preheating, thawing, weed burning and other operations requiring intense, directly applied heat.

A locomotive fire lighter operating on the safety vacuum principle is also available.

Cylinder Centering Spider

The illustration shows an exceptionally rigid, accurate and easily-adjustable cylinder centering spider. It consists of a circular frame and diagonal cross-bars, made in this instance of aluminum, with four cross-bar extensions which are drilled and tapped to received pointed adjusting screws which make firm contact with the wall of the cylinder bushing. A rotating radius bar, also easily adjustable as to length, enables this spider to be quickly and accurately adjusted to bring the center line at the exact center of the cylinder bushing, where it is positively held in the correct position during all subsequent guide lining operations.

Cylinder centering spider which is easily adjustable, accurate and convenient to use

This device, like all good tools, costs something to

make but is greatly superior to the make-shift devices frequently used for this purpose. With the present scarcity of aluminum, other materials can doubtless be used but a good mechanic always likes to handle tools which are made as light as practicable, consistent with strength and accuracy.

Template for Planing Trailer-Box Roller Caps

By W. G. Corbett

In the February *Railway Mechanical Engineer,* one of the operations described was the machining of Devoy trailer-box roller caps. This job was previously handled one at a time on a frame slotter at the Milwaukee shops of the Chicago, Milwaukee, St. Paul & Pacific. Eight of these are now machined on a planer, four vees being cut all at one time, as shown in the illustration, using two tool holders with two tools in each. The holders are machined so that the tools, 1¼ in. by 1¼ in. by 7 in., can be set 6 in. apart, which is the center spacing of the vees. A template is then made to blueprint dimensions from plywood, ¾ in. thick, which is used to lay out the pieces to be machined, with the vees located correct distances from the uprights.

A horizontal bar is fastened to the cross rail, set far enough out from the faces of the heads on the rail to clear. The horizontal template is then clamped to the bar properly and centered over the work and the tools all set the same height and correctly spaced for cutting. When the tools are fed in the required amount for cutting, a dial gage, which is fastened on the front of one of the heads most suitable for the vision of the operator is set to register zero. It is good practice to set the dial indicator so that it has made one complete turn so as to be sure there is some tension on the dial, then set on zero. The cross feeds are engaged and as the figure on the dial gage will change while feeding across, the down feed which is done by hand will be kept on zero at all times until the cut runs out.

This job is performed more accurately by the new method and with a saving of 60 per cent in machining time. This same method of using templates and a dial indicator works well in machining large dies and planing engine-lathe and planer bases, beds and parts.

Multiple planing operation on eight Devoy trailer-box roller caps at Milwaukee shops of the C.M.St.P. & P.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Welding Cracks Near Staybolts

Q.—A crack has developed in the low-water-alarm connection on one of our Mikado type locomotives. The connection is located in the third course and is in the staybolt area. Due to the fact that the crack is located in the staybolt zone, is it satisfactory to repair it by drilling a hole at the end of the crack, veeing out the crack for its entire length and welding it?—F. H. M.

A.—Welding repairs on locomotive boilers are permitted only where the strength of the structure is not dependent upon the strength of the weld. In computing the strength of the third course, the staybolts are not

considered as supporting the shell and, therefore, the staybolt area cannot be considered as self-supporting as in the case of the firebox side sheets. Any crack in the shell of a locomotive boiler should be repaired with a properly designed riveted patch.

Function of Feedwater-Heater Steam Valve

Q.—What is the purpose of the live-steam valve used in connection with the feedwater heater? Is it a necessary part of the feedwater heater? How does it function?—R. I. M.

A.—The live-steam valve is used to furnish live steam to the feedwater heater when exhaust steam is not available. Without the use of the live-steam valve the feedwater heater and feedwater pump could be used to advantage only at such times as the locomotive was in operation due to the fact that the feedwater is heated by the exhaust steam from the cylinders. To operate the feedwater heater and pump when the locomotive is not in operation would cause cold water to be delivered to the boiler to the detriment of the boiler.

The live-steam valve is composed of a main steam valve and a pilot valve. The main steam valve is held to the seat by a spring and by boiler pressure. It is opened by steam flowing through the pilot valve and taken from the feed-pump steam line between the pump throttle valve and the pump, thus the main valve controlling live steam into the feedwater heater, is opened only when the pump is in operation.

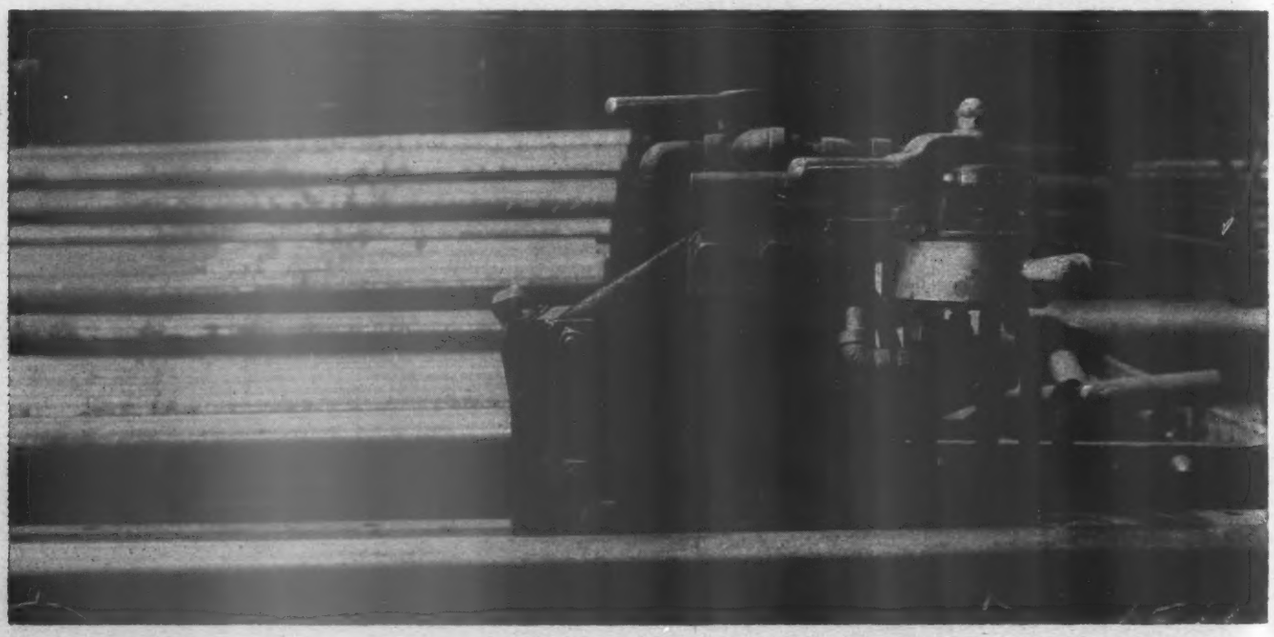
The pilot valve controls the flow of this pump steam to the main valve and is in turn controlled by the main steam-pipe pressure of the locomotive by piping it to the chamber above the pilot valve. A spring below the valve is normally set so that the valve operates at 75 lb. steam-chest pressure, thus a pressure of over 75 lb. in the steam chest shuts the pilot valve which in turn closes the main valve.

If the pump is started with the throttle shut off, the pilot valve is open and allows pump steam to flow to the main valve, opening it and passing live steam into the feedwater heater.

If the throttle is then opened up, the pilot valve closes due to the pressure overcoming the spring in the pilot valve, the steam trapped between it and the main valve is vented to the feedwater heater body through a ⅛-in. choke, allowing the main valve to close, cutting off the supply of live steam from the boiler to the heater. If the pump is started when the engine is working, the pilot valve, being closed, prevents the flow of steam to the main valve. The live steam valve is not a necessary part of a feedwater-heater system but is used to increase the efficiency of feedwater-heater systems, that now operate utilizing exhaust steam only.

Air-Operated Flue-Testing Machine

The air-operated right head of a flue-testing machine, used at the Louisville & Nashville boiler shop, South Louisville, Ky., is shown in the illustration. Safe-ended tubes and flues roll to this machine in the usual manner and are tested by one man using soapy water applied with a brush over the weld after each flue has been filled with air at the shop line pressure. Tubes and flues which pass the test roll on through the machine into a portable floor rack provided for each locomotive and the occasional flue which shows a defective weld is lifted by a pair of air-operated arms which throws it into a rack of defective flues.



Air-operated flue tester used at the South Louisville boiler shop

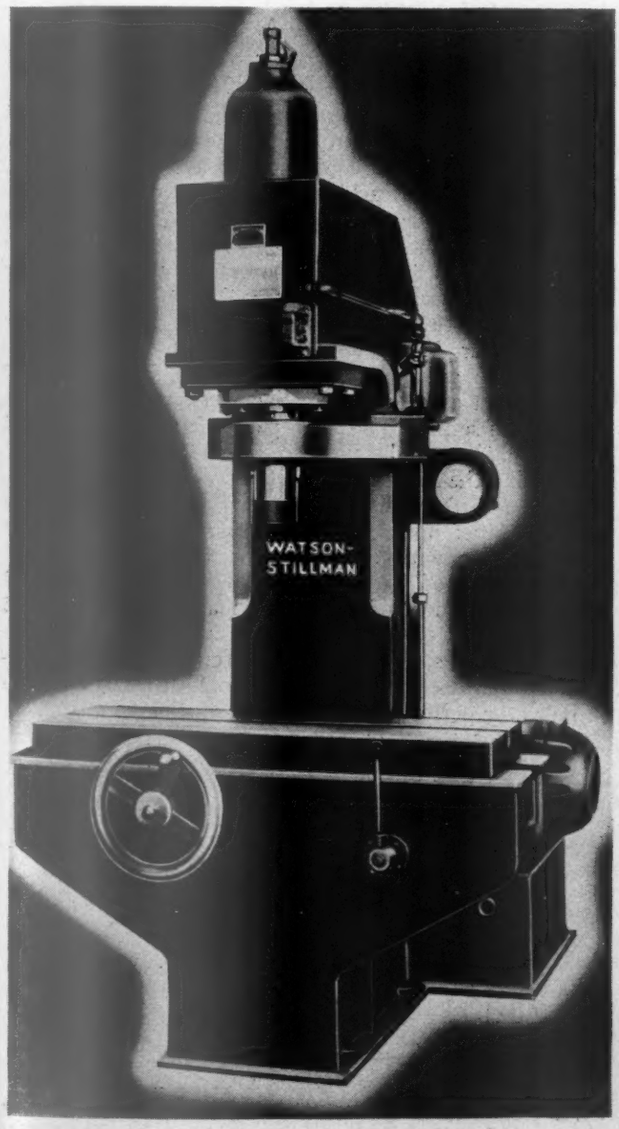
The flue tester head is adjustable back and forth on the ways of the testing machine to accommodate flues of different lengths and, after a flue is rolled in place ready for testing, the first movement of the brake valve operating handle clamps the head of the tester solidly in position. The next movement of the operating handle admits air to a small cylinder on the left end of the testing machine and forces the flue up against the main head rubber gaskets, shown in the illustration. The piston rod of the operating cylinder is hollow and supplies air to the flue at shop line pressure and sustains this pressure while the soapy water is being applied to test the welds.

Release of the air pressure by another movement of the brake-valve handle quickly withdraws the left-hand piston and permits the flue to roll through the machine and drop into the rack of tested flues. Operation of a foot treadle releases a trip which permits the next tube or flue to roll into place in the testing machine. The ejecting arms for removing defective flues are operated by a three-way air cock, as shown in the illustration. The head of the testing machine travels on ball bearings so arranged that they do not carry the weight of the head when clamping pressure is applied.

Straightening Press of 50 Tons Capacity

A new model 50-ton straightening press adaptable for use in straightening rods, bars, tubes and structural shapes is being manufactured by the Watson-Stillman Co., Roselle, N. J. Using a manually movable table four feet long and 14½ in. wide with a 24-in. travel, quick and accurate positioning of the work is possible.

The machine has a 20-in. opening, a 14-in. stroke and a 12-in. gap. Advance speed is 109 in. per minute, pressing speed 18 in. and return 90 in. Operation is by an oil gear pump driven by a 5-hp. motor and sensitive control is governed by a single hand lever.



Straightening press of 50 tons capacity for rods, bars, tubes and structural shapes

Using Carbide Tools On Large Machines

*By Fred W. Lucht**

Until recently there was little interest in the idea of applying carbide tools to large machines such as boring mills, large vertical turret lathes, engine lathes, etc. Not only were such large machines rarely run on a continuous basis, but most of them were old types, designed for low-speed cutting (25 to 30 ft. per min.), were insufficiently powered to use carbides, and lacked the rigidity required for higher-speed operation.

Today the situation is different. Many a large machine is on the critical list. Production on such machines has had to be stepped up under pressure. It is not surprising, therefore, that there is a sharp increase in the use of carbide tools on large machines.

Fundamentally, there is no reason why carbide tools cannot be applied successfully to most large machines, particularly those of the newer designs. These later machines are built with greater rigidity and for higher

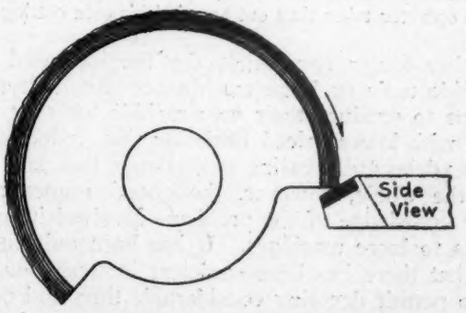


Fig. 1—Sketch illustrating the "shear" cut obtained with the newer negative rake Carboloy tools now used on machining large work with interrupted cuts. Impact load is not concentrated on point of tool

cutting speeds than their earlier prototypes and are usually higher-powered.

Carbide tools were originally used only on cast-iron and non-ferrous machining operations and, even on these materials, they were restricted to continuous cuts for a long time after their introduction. It was widely believed that they lacked sufficient strength to handle interrupted cuts. When carbide tools were tried on such cuts, tool breakage sometimes occurred. Tool-breakages were also caused by sand in the castings, big run-outs, heavy scale, etc. Now this picture has changed completely and carbide tools take the whole gamut of interrupted cuts, even the harder and tougher steels.

Among the factors which have contributed to broadening the use of carbide tools on large work and large machines generally are:

1—Vastly increased knowledge of proper speeds and feeds as well as improved clamping fixtures, rigid tool holders, etc.

2—Better determination of shank and tip sizes required for handling heavy cuts.

3—Increased knowledge of tool shape and cutting angles. For

* Engineer, Carboloy Company, Inc.

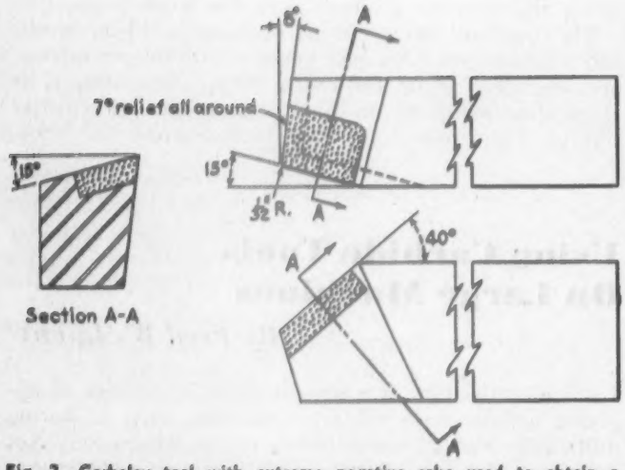


Fig. 2—Carboloy tool with extreme negative rake used to obtain a "shear" cut. This tool is best suited to roughing cuts on large diameters. It is not recommended for most finish cuts because the chip curls toward the work and spoils the finish

example, the development of negative back-rake-angle tools. In some instances these negative back rakes have been carried to an extreme degree to obtain a shear type of cut. (See Figs. 1 and 2.) The tools are so designed that the impact following an interruption is minimized by gradual entry of the tool into the cut, since with a negative back rake the initial load is taken back away from the nose of the tool.

4—The general adoption of centralized grinding in the tool room for reconditioning single-point tools as well as reamers, drills and other end-cutting tools. Centralized grinding assures proper grinding of the carbide tools by trained grinder hands and at the same time saves costly time which is lost when the machine operator takes time out to grind his own cutting tools.

Another factor responsible for the increased useage of carbide tools on large machines is the ability, today, of shops to produce their own carbide tools by tipping shanks with lower priced Carboloy tips, reducing costs, avoiding delays, decreasing tool salvage loss, etc.

On the whole, however, the question goes back to greater knowledge of the problems involved in applying carbides to large machines. It has been only in recent years that there has been sufficient interest along these lines to permit devoting considerable time and effort to the problem on the part of both the user and the tool manufacturer.

The advantages of the use of carbide tools on large machines may be summarized as follows:

1—Increase of cutting speed permits a reduction in feed, insuring better finish, without reduction in metal removal. Since higher cutting speeds go hand in hand with maximum efficiency and output, the machines should be capable of running at speeds about twice those normally uled with high-speed steel.

2—The use of lighter feeds permits the use of lighter fixtures, of simpler design and lower cost, which are quicker to build. Best results were obtained when the feeds were held below .030. The lower feeds as compared with high-speed steel practice were in practically every instance more than offset by the higher cutting speeds employed.

3—With lighter fixtures, lighter, thin-wall parts can also be machined more effectively and quicker. Parts do not have to be chucked or fastened as securely, thus avoiding distortion.

4—Carbide tools usually provide longer tool life per grind, reducing down-time, set-up time, etc. Shanks must be large enough to take care of the tool overhang which is frequently of considerable magnitude on large boring mills. Charts are available for selecting correct shank and tip proportions.

5—Carbide tools permit the ready machining of harder materials, such as armor-plate castings and forgings and heat-treated alloy steels of 300 to 500 Brinell hardness.

6—Operators turn out more work with less effort because they do not have to replace and grind tools so often, nor check as often for changing dimensions due to tool wear. A centralized grinding room is an important factor in obtaining maximum performance of both machine and cutting tool.

In putting carbide tools to work on large machines we have frequently found that the advantages gained far exceeded the results attributable to carbide tools alone. Many large machines are operated on the basis of antiquated practices handed down from year to year and from decade to decade.

The mere introduction of a new element, such as carbide tools, has, in many cases, permitted reorganizing machining practice in a manner which would have been difficult to accomplish without the introduction of a relatively new and unknown factor.

Prime among shop-practice improvements along this line have been the following: (1) Planned cutting; (2) adoption of tool-setting devices for quicker set-up and, (3) greater usage of machine dials as a check on cutting.

Planned cutting means nothing more than changing the order of cuts, etc., in order to remove stock in the fastest way. It is surprising how little deductive reasoning is applied to this question in some plants—such as the rough facing of a part before turning to reduce the excessive run-out of the work (see Fig. 3). This may not only reduce the travel of both the turning and boring tools but will also enable them to start the cuts in clean metal instead of rough scale, allowing the tools to hold size better and tending to reduce the floor-to-floor time because of less time required for changing dull tools. In some cases, with carbide tools, we have found it possible by planned cutting to reduce machining time by many hours. Cutting a 30-hour machining job down to 8 or 10 hours by such simple expedients is no longer regarded as unusual.

The adoption of some form of tool-setting devices for quicker set-up is another factor which can contribute materially to greatly increased output. It's not a bad idea to adopt a "get rid of calipers" slogan. Indicators, simple tool-setting gages as part of the fixture, and machine dials may be used to speed tool set-up.

Checking the machine-dial setting when changing tools provides a surprisingly accurate method of speeding tool setting. Most operators don't trust these dials, based on experience with older, less accurate machines and dials. The use of ground lead screws, accurately marked dials, etc., on most of the newer machines has changed the situation.

On some jobs, where chip interference does not prevent, another useful trick to speed tool setting is to clamp an indicator permanently on the cross-slide.

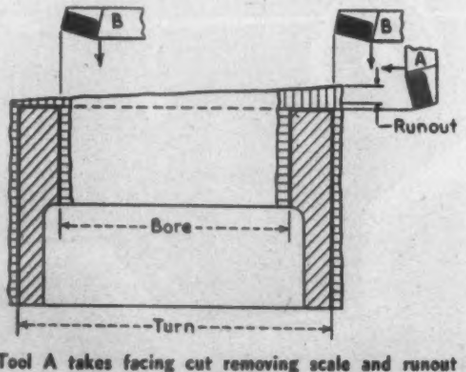


Fig. 3—Tool A takes facing cut removing scale and runout on back of casting. Tools B then take turning and boring cuts. This practice enables tools B to hold size better throughout entire length of cut since they start in clean metal

High Spots in
Railway Affairs . . .

Railroad Employment

According to the Interstate Commerce Commission railroad employment in June was up 11.83 per cent over June of last year. There were 1,292,595 employees in mid-June. Train and engine service increased 14.87 per cent; professional, clerical and general, 13.3 per cent; yardmasters, switch tenders and hostlers, 13.01 per cent; maintenance of equipment and stores, 11.42 per cent; maintenance of way and structures, 10.91 per cent. These figures, however, do not reflect the real seriousness of the employment situation. The railroads have lost or are losing many experienced and valuable employees. As a result, attention as never before is being concentrated upon employment methods and special refresher and training practices. In this latter respect much can be learned from the programs inaugurated under the direction of the Training Within Industry Branch of the Labor Division of the Office of Production Management, of which Channing R. Dooley is chief. Among the practices now followed by some railroads in the effort to maintain their forces are the holding of employees in service beyond retirement age, calling back men from retirement, employing men well beyond the age limits specified under normal conditions, hiring physically handicapped for work to which they are suited, and the hiring of women for tasks not considered within their realm under normal conditions.

Transport Board Life Extended

The Transportation Act of 1940 provided for the creation of a Board of Investigation and Research to study our transportation problems and make recommendations for their solution in the public interest. It was hoped that an able and unbiased board would quickly be selected and that it would make real headway on one of the most complicated and vital problems involved in our national economy. It was specified that it would have a life of two years from the enactment of the law on September 18, 1940. For one reason or another, the board was not appointed promptly and it did not assume office until August 22, 1941, or very nearly a year after the enactment date. Obviously, it is not now prepared to present a final report and the President on June 26 issued a proclamation extending its life for two years, or until September 18, 1944. The proclamation included the statement that "an efficient transportation system is essential to the nation in peace and war, and the national interest requires the development of informed policies by which such a system may be promoted, strengthened and maintained." The question now is, are the men on the board big enough to do the job and will their recommendations be available in time to be of value in the postwar period, with all the readjustments that will be required to adapt our transportation facilities to peacetime conditions.

Travel Habits Changing

Gasoline rationing in the East and the effort to conserve rubber by restricting travel promise to bring about a marked change in the living habits of many of our people. It is rather difficult, however, to change American habits quickly and the resources of the railroads were strained to the limit by passenger travel over the July 4 holiday weekend. This was in spite of the fact that O. D. T. Director Eastman indicated that "a patriotic way to observe the Fourth of July this year" was "to dispense with needless travel." The railroads did what they could to co-operate with Director Eastman, and for the first time in many years no special July 4 excursions were operated to or from any of the large eastern cities. Moreover, the railroads in their advertising urged the public to make allowances for crowded conditions and, if possible, to avoid the peak periods. Undoubtedly this did discourage great numbers of people from traveling over the holiday weekend. In spite of it all, railroad travel assumed record-breaking proportions, although highway traffic was much less than usual and highway accidents over the holiday were greatly reduced, as compared with previous years.

Daniel Willard

Seldom has the passing of a railroader attracted such nationwide attention and comment as that of Daniel Willard, chairman of the board of the Baltimore & Ohio. A great railroad executive—he had fought his way from the bottom and was thoroughly familiar with all departments of railroading—he was held in the highest esteem, not only by the men in his own organization, from the top to the bottom, but by railroaders generally and by governmental administrators as well. A man of keen human sympathies, he visioned as his ideal the practical application of the Golden Rule. Labor leaders trusted him and several times in national transportation emergencies he was an important factor in assisting labor, managements and public authorities to compose their differences. It is not to be wondered at that the labor union-management co-operative plan established on the Baltimore & Ohio many years ago proved so successful. In spite of his advanced age, as chairman of the board he continued to follow closely many of those activities in which he had been specially interested. He carried cards in his wallet with up-to-date statistics about them. One of these included, in compact form, facts about the suggestions made by the co-operative committees and what disposal had been made of them. Always, however, he insisted that these accomplishments had been made possible because of the spirit of mutual trust and reliance that dominated this activity. Many people smiled indulgently at Donald Nelson's advocacy of labor-management committees in war production plants, with the objective of increasing production. C. J. Symington (see page 336) and Daniel Willard had never compared their experiences in the co-operative movement, but it is significant that both of them ascribe the same underlying or fundamental reasons for the success of their projects.

Integrated Transportation

A chief executive of a railroad who frequently comes in contact with shippers is careful in discussing business with them to avoid the use of the word railroading, and to speak in terms of transportation. Naturally he is keen to protect the interests of his own road, but he has found, in the long run, that it does not necessarily mean that he must strive to get the longest possible haul over his road for the shipments. Sometimes, by being content with a shorter haul, the railroad can combine with other types of carriers in such a way as to give better service to the shipper, and in the final analysis the railroad may secure a greater amount of business on a ton-mileage basis. So far as the public authorities will permit, there has been a growing tendency for many years to coordinate transportation activities. The railroads today, for instance, operate a great number of highway trucks and buses, either by direct ownership or by contract. They were in normal times one of the best customers of the automobile manufacturers. Donald D. Conn, in testifying before the Board of Investigation and Research, advocated that the transportation companies should be integrated now, during the war period, and "must not await the uncertain repercussions of a post-war period of readjustment." He defined integration as "the working together of all forms of transport for a mutual advantage and a composite service to the public." If some real generalship is not exercised in this direction it is to be feared that the overdevelopment of special types of transportation after the war may bring about an unbalance that may cost the public dearly in the end.

NEWS

Gray Becomes Brigadier-General

COL. CARL R. GRAY, JR., has been promoted to Brigadier-General continuing in charge of the Military Railway Service, with headquarters as before at Ft. Snelling, Minn.

Brigadier-General C. D. Young Returns to ODT

BRIGADIER-General Charles D. Young, director of procurement and distribution, Services of Supply, War Department, was returned to inactive status on June 30, having reached the Army's statutory retirement age. General Young, a former vice-president of the Pennsylvania, has returned to the Office of Defense Transportation as an assistant director, functioning as liaison on matters of material and equipment between ODT and the Transportation Service of the Services of Supply, and between ODT and the War Production Board. At the time of his call to active service, he was director of ODT's Section of Materials and Equipment.

During his tour of active duty General Young served with the Supply Division (G-4) of the War Department General Staff until last March's reorganization when he became director of procurement and distribution in the Services of Supply.

Master Boiler Makers to Hold "Convention in Print"

ALTHOUGH the Master Boiler Makers' Association had anticipated celebrating its fortieth anniversary by holding a regular meeting of members, in compliance with the request of the Mechanical Division of the A. A. R., it has called off plans for such a meeting. The annual proceedings of the Association will be published based on committee reports submitted after a study of the replies received to questionnaires forwarded to every leading railroad of the country. It is hoped that complete cooperation will be given by railroad officers to whom these questionnaires have been sent. The Mechanical Division of the A. A. R. has approved the choice of subject matter.

Six topics have been selected for study and reports. The first covers general prevention of cinder cutting of locomotive boilers. Application and maintenance of flues, tubes, and arch tubes with special relation to the use of copper ferrules and of welding will be discussed in the second paper. Topic three is concerned with the chemical treatment of boiler feedwater and the use of terminal and line-of-road blowdowns. A study of defects in boilers carrying 200 lb. and over 250 lb. pressure will be made in the fourth paper with particular reference to the nature of defects developed, the materials used in construction, plain carbon steels or alloys, age of boilers and pressures at which defects develop, the effect of different fuels, and general methods of repair. Topic five is related to topic four in that it will include recommendations of the latest methods being used in the fabrication of boilers made of iron, steel and alloy materials. The last paper will deal with the methods of reclamation, conservation, and substitution being practiced on boiler materials.

Beyer on Manpower Commission

OTTO S. BEYER, director of the Office of Defense Transportation's Division of Transport Personnel, has been appointed to membership on the War Manpower Commission, according to a recent announcement from WMC Chairman Paul V. McNutt. Mr. Beyer will represent ODT and the War Shipping Administration.

A. A. R. Conservation Drive

"AN intensive campaign to conserve material and reclaim every bit that can be salvaged so that our armed forces may be supplied with arms and equipment is being conducted by the railroads of this country," said a July 15 statement from the Association of American Railroads. The Purchases and Stores Division, in cooperation with the Mechanical and Engineering Divisions, have just revised and sent to member roads instructions as to the reclamation of materials by recovery and repair covering a much wider scope than ever before.

Leaflets and posters carry the "Don't waste anything" campaign to all railroad employees in a five point program—"conserve, convert, use it up, make it do, and save the pieces."

More than 700 definite recommendations have been listed by the divisions for recovery and repair of materials. Based upon a "thorough study of the practices in use on various railroads, revised according to actual results obtained," these recommendations cover practically every article used by the railroads, ranging from discarded linen from dining cars and hair taken from seat cushions to steel rails and locomotive axles. Special attention is paid in the new instructions to substitutes for rubber, and the marketing of rubber scrap. Equal stress is placed upon scrap metal which, the railroad salvage campaign declares, is today "precious metal."

ODT Rail Transport Staff Appointments

Two recent appointments to the staff of the Division of Railway Transport, Office of Defense Transportation, include the assignment of Shannon Kuhn to the position of locomotive assistant, specializing in locomotive repair problems, in the Mechanical Section; and of Frank J. Swanson as service representative in the Mechanical Section. Mr. Swanson, who has been supervisor in the Chicago, Milwaukee, St. Paul & Pacific's car department at Chicago, will visit car builders and railway shops to aid in facilitating car building and repairing. Mr. Kuhn comes to ODT from the position of general foreman in the Cleveland, Ohio, shops of the New York Central.

Malleable Iron Parts For A.A.R. Valves

As a result of discussion between representatives of the government, various manufacturers, and the A. A. R. Mechanical Division, Executive Vice-Chairman V. R. Hawthorne reports in a letter to members of the Division that malleable iron was agreed upon as a possible substitute for brass in certain parts of globe and angle valves. Some sample valves of the A. A. R. standard design were made up with bodies and bonnet union rings of malleable iron. These valves were subjected to severe laboratory tests in comparison with corresponding all-brass valves. In these tests, "the malleable iron valves withstood various physical tests, such as hydrostatic pressure, the application of piping strains, excessive torque on the handwheels and severe thermal shock, as well as or better than the brass valves."

On recommendation of the Committee on Locomotive Construction, the General com-

(*Continued on next left-hand page*)

Orders and Inquiries for New Equipment Placed Since the Closing of the July Issue

Road	No. of Locos.	Type of Locos.	Builder
LOCOMOTIVE ORDERS			
Central of Georgia	1	1,000-hp. Diesel-elec.	Electro-Motive Corp.
Denver & Rio Grande Western	6	44-ton Diesel-elec.	General Elec. Co.
FREIGHT-CAR ORDERS			
Chicago & North Western	25[1]	70-ton flat cars	Company shops
Denver & Rio Grande Western	550	Gondola	Pressed Steel Car Co.
	450	50-ton gondolas	Mt. Vernon Car Mfg. Co.
Lehigh Valley	1,000[1]	Hopper	Bethlehem Steel Co.
Missouri Pacific	650[1]	Gondola	Pressed Steel Car Co.
FREIGHT-CAR INQUIRIES			
National Tube Co.	30	70-ton hopper	.....
Utah Copper Co.	100	100-ton ore	.....

[1] Release received from the War Production Board.

Worried About WHEELS?

Read These Quick Facts and You'll Feel Better

1. 2,293,000 new Chilled Car Wheels were delivered last year—30% more than 1940—and yet only 61% of the production capacity ready today.
2. The Chilled Car Wheel Manufacturers are prepared to supply all replacement needs, plus wheels for 187,000 new freight cars.
3. Chilled Car Wheels require no critically strategic materials—only iron is needed and much of that is used over and over as wheels are retired under the unique exchange plan.
4. There are 15,000,000 Chilled Car Wheels in service on the railroads of the United States and Canada.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS

230 PARK AVENUE,
NEW YORK, N. Y.

445 N. SACRAMENTO BLVD.,
CHICAGO, ILL.

AMCCW

ORGANIZED TO ACHIEVE:
Uniform Specifications
Uniform Inspection
Uniform Product

mittee has approved for general locomotive use, except for steam and water lines inside the cab, valves of A. A. R. standard design with certain parts made of malleable iron as set forth in a specification which will be inserted in the Manual of Standard and Recommended Practices to govern the manufacture of A. A. R. standard valves for general locomotive use, except as stated above, for the duration of the war.

This action is taken with the full knowledge of the Bureau of Locomotive Inspection, I. C. C., which has ruled that "inasmuch as these valves will not be located inside locomotive cabs there will be no objection to their use."

A. A. R. Mechanical Division Circulars

Wheel and Axle Manual.—Subsequent to issuance of the 1942 edition of the Wheel and Axle Manual, the Committee on Wheels and the Arbitration committee have recommended, and the General committee has approved, a revision of dimensions appearing in Fig. 106 on page 119. The gap for the flange shown on the right-hand gage as 1 in. is modified to read 1 1/16 in. The gap for the flange shown on the left-hand gage as 1 1/16 in. is modified to read 1 1/8 in. Secretary A. C. Browning requests that the revised manuals be corrected accordingly.

Remount Gage Limits Revised.—In the interest of conserving wheel material, upon recommendation by the Committee on Wheels and the Arbitration committee, the General committee has approved a revision of the following remount gages to become effective July 1, 1942, in a supplement to the current Code of Interchange Rules recently issued. The flange limit remount gage shown at the right on page 155 is revised to decrease the flange gap from 1 1/8 in. to 1 1/16 in., and increase the flange height from 1 9/16 in. to 1 7/16 in., the title being changed to read "Limit Gage for Remounting One Wear Wrought-Steel Wheels." The left-hand gage is revised to decrease the flange gap from 1 3/16 in. to 1 1/8 in., and increase the flange height from 1 5/16 in. to 1 3/8 in., the title being revised to read "Limit Gage for Remounting Cast-Iron and Cast Steel Wheels." The tread limit remount gage on page 157 is revised to increase the 1 3/8-in. dimension to 1 5/16 in., 1/16 in. also being added to the projection and the title changed to read "Tread Limit Remount Gage for Cast-Iron and Cast-Steel Wheels." The tread-worn hollow gage on page 151 is revised in title only to read "Tread-Worn Hollow Gage—Condemning Limit for Cast-Iron and Cast-Steel Wheels."

Stevens Institute Scholarship.—Recognizing the increased need for technically-trained men, the A. A. R. Mechanical division has called attention again to its special scholarship award at the Stevens Institute of Technology, amounting to a total value of $1,200, which will be available this September and is offered to the sons of members of the Division. This scholarship was established in 1891 and those who have won it in the past 51 years have in many cases attained positions of distinction in the engineering profession. The student designated for this scholarship will receive the benefit of the sliding scale of tuitions at the Stevens Institute of Technology, Hoboken, N. J.

Kelly Succeeds Hollar

WARREN W. KELLY, associate director of the Office of Defense Transportation's Section of Materials and Equipment, has been appointed director, succeeding Philip A. Hollar who has been acting director since March. Mr. Hollar, who was formerly assistant stores manager of the Pennsylvania, has returned to the Association of American Railroads as special representative of the Operations and Maintenance Department, the position he was holding when he joined the ODT staff.

Mr. Kelly, former general purchasing agent of the Atchison, Topeka & Santa Fe, came to ODT in June.

C. W. Brown has been appointed assistant director of the Section of Materials and Equipment. He has been with ODT since February, and was formerly associated with the federal coordinator of transportation.

Hill Becomes Inter-American Equipment Consultant

MAJOR Howard G. Hill, who has been assistant to the chief of the railway section in the office of the chief of engineers, at Washington, D. C., since August 1, 1940, has been promoted to the rank of Lieutenant Colonel, transferred to the Executive Office of the President, and assigned to the Office of the Co-ordinator of Inter-American Affairs as railroad equipment consultant. He has been detailed as chief of a special mission to investigate the condition of motive power and rolling stock, shops, track and operating methods on the National Railways of Mexico, including both standard and narrow-gage lines. Colonel Hill began his railroad career as an apprentice machinist on the Southern Pacific's Texas and Louisiana lines, in August, 1914. Subsequently he served in turn as draftsman, inspector, instructor of apprentices, locomotive fireman, brakeman and mechanical engineer in charge of locomotive valuation work. In 1920 he joined the Texas Corporation and was associated with that company for 14 years as machine designer, lubricating engineer, and engineer of tests, principally in connection with railway equipment lubrication tests and development work on railroads. He became associated with the Hennessy Lubricator Company, New York, in 1935 as sales and service engineer for western and southwestern states, and specialized in railway equipment lubrication until being called into army service in August, 1940. While in the office of the Chief of Engineers, Colonel Hill prepared specifications for a large amount of military railway equipment now being built for the War Department.

Lt. Col. Howard G. Hill

"Blackout Coach"

A COACH equipped for safe "blackout" travel according to specifications prepared by the Association of American Railroads has been put on exhibition at the principal stations of the Reading.

Alterations to the car closely follow standards developed in England under actual air-raid conditions. The edges of all windows have been painted with a black band four inches wide, so that light around the sides of drawn shades will not be visible from outside. The paint is applied on the outer side of the glass to prevent its removal by passengers. Glass in end doors and vestibules is painted solid black except for a one-inch peephole.

A resistance placed in the lighting system permits the car lights to be dimmed during blackouts by reducing the voltage from 32 to 9 volts. It is estimated that cars could be equipped to meet A. A. R. requirements for about fifty dollars each if such operations were undertaken on a large scale.

A Few Mechanical Advisory Reports Still Available

IN order to dispose of the few remaining copies of the report of the Mechanical Advisory Committee to the Federal Co-ordinator of Transportation, issued in 1936, Secretary A. C. Browning advises that this report will be sold to members and non-members at a special price of $3 a copy plus shipping charges until the supply is exhausted.

Also a small supply of the following reports is still available: Tests of Trucks and Truck Springs, December, 1937; Air-Conditioning of Railroad Passenger Cars, April 15, 1937; Road Performance of Air-Conditioned Pullman Sleeping Cars, October, 1937; Relative Performance of Air Filters, January 15, 1938; Impact Tests of Light-Weight Box Cars, October 1, 1937; Comparative Impact Tests of Pullman Light-Weight and A. A. R. Standard Box Cars, February, 1938; Second, Third, Fourth and Fifth Progress Reports Covering Passenger Axle Car Tests, June, 1941; A. A. R. Passenger Locomotive Tests, February, 1939; Tests of Trucks for High-Speed Freight Service, April, 1940; Failures and Performance of Main Crank Pins on Steam Locomotives, May, 1940; Determining Counterbalance Effects by Rail Stress Measurements, January, 1941.

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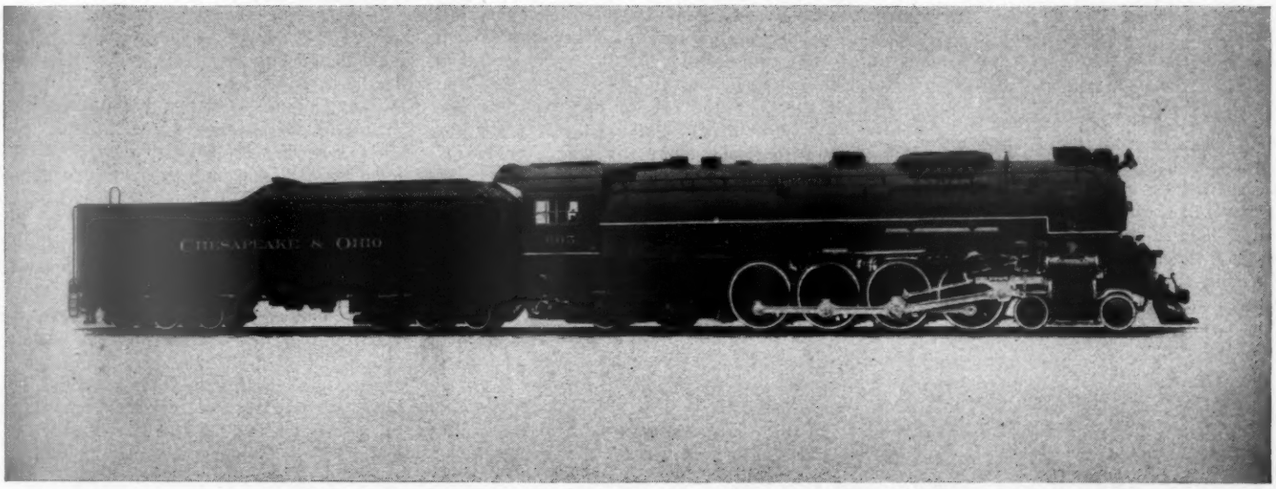
★ ★ ★ ★ TIME and TONNAGE ★ ★ ★ ★

are the important considerations



Maximum gross-ton-miles per-train-hour are becoming increasingly important as America's war effort slips into high gear. The only power that can meet today's demands for heavier loads moved at steadily reduced running time is . . . MODERN SUPER POWER.

Lima has pioneered in the construction of this type of steam power, and is prepared to build locomotives of the latest design to help you to . . . "KEEP 'EM ROLLING."

LIMA LOCOMOTIVE WORKS LIMA LOCOMOTIVE WORKS INCORPORATED **INCORPORATED, LIMA, OHIO**

Letter Ballot Return

THE Secretary of the Association of American Railroads, Mechanical Division, reports a favorable return on letter ballots submitted to the membership in Circular D.V.-1033, on May 18, 1942. One of these ballots pertains to modifications in the recommended instructions governing the operation of passenger cars in freight trains, these modifications being recommended by the Committee on Brakes and Brake Equipment. Similarly, the recommendations of the Committee on Car Construction in connection with definitions and designating letters for cars was approved; also the recommendation from the Committee on Specifications for Materials to modify Specification M-116-steel, structural shapes, plates and bars. All of these recommendations have been approved, effective immediately.

Shopmen Give Up Vacation Time, But Get Pay

APPROXIMATELY 7,000 shop employees of the Chesapeake & Ohio have agreed to forego vacations this year, it was announced recently, in order to keep operations going at full speed during the present emergency. The railroad management has agreed to pay them at the regular rate for the vacation time they are giving up, in addition to the wages they earn at work during the period the vacations would have covered.

Equipment Purchasing and Modernization Program

Canadian Pacific.—The Canadian Pacific has awarded a contract to G. A. Baert, St Boniface, Man., for an extension of 25 ft. to nine stalls of the enginehouse at Winnipeg, Man., to make the stalls 120 ft. long; the construction of a new fan room 30 ft. by 38 ft. of concrete and brick, and a new staff building 52 ft. by 98 ft. of similar construction. The staff building will be heated by steam radiators and unit heaters, and will contain offices for the timekeeper, crew clerk and locomotive foreman; an engineer's locker room; shop lavatory and a mess room.

Chicago & North Western.—The C. & N. W. has asked the Interstate Commerce Commission to approve a plan whereby the trustee of a recent equipment trust will invest some $3,750,000 of the proceeds of the trust dated March 5, 1942, in government bonds until such time as the equipment called for in the trust is available. The company also seeks authority to substitute gondola, hopper, flat or box cars for equipment specifically called for in the equipment trust. The commission was informed that 75 per cent of the holders of the certificates have agreed to the change in the trust.

Missouri Pacific.—Because of a shortage of equipment due to the war needs, the Missouri Pacific has been authorized by Division 4 of the Interstate Commerce Commission to substitute in Finance Docket No. 13481 100 50-ton, 50-ft. all-steel flat cars and 238 50-ton, 40-ft. 6 in. all-steel box cars for 50 covered cement hopper cars and 200 automobile cars. The estimated cost of the new equipment is $1,053,909 as contrasted with $981,167 for the equipment which the company is unable to obtain. The road has also been authorized by the District Court to purchase four 5,400-h.p. Diesel-electric freight locomotives at a cost of $1,920,000.

New York Central.—Because of a shortage of equipment due to the war needs, the N. Y. C. has been authorized by Division 4 of the Interstate Commerce Commission in Finance Docket No. 13341 to substitute certain other equipment for 1,928 55-ton steel box cars costing $5,109,200, and seven Diesel-electric switching locomotives costing $305,032. The company's application told the commission that arrangements have been made for the construction of "substantial numbers" of freight locomotives, switching locomotives, and gondola cars, and that it believes that certain needed hopper and flat cars may also be obtainable. The company will execute additional trusts as soon as it becomes known what equipment will be available. The company also noted in its application that the production of box cars had been stopped by the War Production Board, while the switching locomotives may be allocated by the Office of Defense Transportation to other carriers if the need for such action should arise.

Northern Pacific.—The Northern Pacific has applied to the Interstate Commerce Commission for authority to assume liability for $2,500,000 of equipment trust certificates, series B, the proceeds to be used to finance in part the purchase of 12 freight locomotives of the 4-6-6-4 type at a cost of $3,247,183.

Pennsylvania.—Because of orders of the War Production Board the Pennsylvania has informed the Interstate Commerce Commission that it has been unable to obtain the following equipment recently authorized in Finance Docket No. 13567:

* * *

Elmore Cave, a war worker in the army tank shop at the Baldwin Locomotive Works, Philadelphia, Pa., being congratulated by his fellow workmen for winning first prize of $1,000 in the annual contest by the American Academy in Rome for his sculpture of a riveter and his helper operating a 90-lb. air gun. In 1941 Mr. Cave was runner up in the Academy's contest. His entry then was two boxers

1,107 50-ton steel box cars; 1,989 55-ton hopper cars; 1,000 70-ton gondola cars; 300 70-ton hopper cars; and 50 cabin cars costing a total of $13,392,850. In place of this equipment the company desires to substitute the following new equipment costing a total of $14,270,000: 500 50-ton hopper cars; 500 70-ton gondola cars; 500 50-ton gondola cars; 49 2-10-4 steam locomotives; and five GGI type electric locomotives.

Pere Marquette.—The Pere Marquette has been authorized by the Interstate Commerce Commission for authority to assume liability for $680,000 of equipment trust certificates, maturing in 10 equal annual installments of $68,000 on June 15 in each of the years from 1943 to 1952, inclusive. The proceeds will be used as a part of the purchase price of new equipment costing a total of $869,342 and consisting of 250 70-ton, 53-ft. 6-in. steel-underframe flat cars.

St. Louis-San Francisco.—This company has been authorized by the Interstate Commerce Commission to assume liability for $2,120,000 of equipment trust certificates maturing in 10 equal annual installments of $212,000 on July 1 in each of the years from 1943 to 1952, inclusive. The proceeds will be used as a part of the purchase price of new equipment costing a total of $2,672,228 and consisting of 12 coal-burning, Hudson type, 4-8-4 steam freight locomotives and three oil-burning, Hudson type, 4-8-4 steam freight locomotives.

Seaboard Air Line.—The Seaboard has asked the Interstate Commerce Commission to approve a plan whereby it would issue $2,280,000 of 2¾ per cent equipment trust certificates which would be either sold to the Reconstruction Finance Corporation or guaranteed by it. The proceeds of the issue, which would mature in 20 semiannual installments beginning January 1, 1943, would be used to purchase new equipment costing a total of $3,069,760 and consisting of six 5,400 h. p. Diesel-electric freight locomotives and two 1,000 h. p. Diesel-electric switching locomotives.

Southern Pacific.—The Interstate Commerce Commission, Division 4, has modified its order of March 25 in Finance Docket No. 13658 so as to permit this road to substitute 12 oil-burning locomotives of the 4-8-8-2 type for some of the steel-sheathed wood-lined box cars originally proposed to be acquired through the $5,660,000 certificate issue. The decision states that War Production Board restrictions will preclude obtaining delivery on all of the box cars. It also reveals that the locomotives, to be built by the Baldwin Locomotive Works, would cost $250,000.57 each or a total of $3,000,006.84; and that WPB "has authorized the necessary priorities for the materials entering into the construction of the locomotives."

Western Fruit Express Company.—Arrangements have been made by the Western Fruit Express Company to borrow $1,500,000 to finance construction of 400 refrigerator cars at estimated cost of $1,695,000. Loan will be payable in 12 semi-annual installments, beginning October 1, 1942, with interest at 2 per cent per annum.

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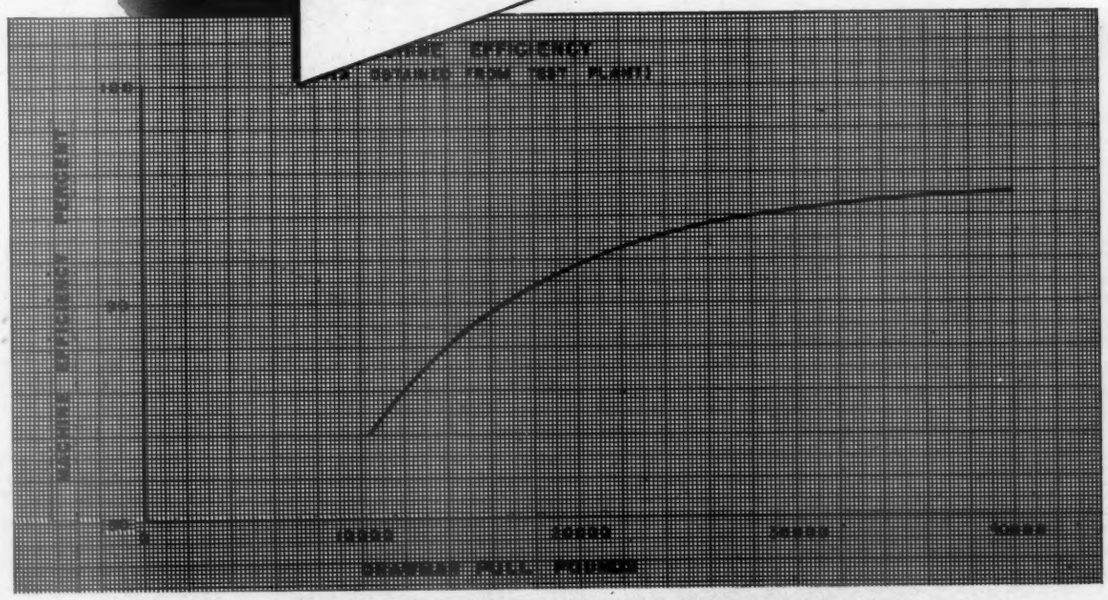
Machine Efficiency

FRANKLIN SYSTEM OF STEAM DISTRIBUTION



MACHINE EFFICIENCY (DATA OBTAINED FROM TEST PLANT)

The inherent advantages of the Franklin System of Steam Distribution over a conventional valve gear and piston type valve, permit a marked improvement in the machine efficiency of the locomotive. Outstanding features that contribute towards this are:

1. REDUCED FRICTION

(a) The short intermittent lift of the poppet valves, as contrasted with the travel of the piston valves, with their rings, drastically reduces the power required for valve operation.

(b) By driving direct from the crosshead and eliminating the conventional outside cranks and rods necessary in a piston valve arrangement, there is a further reduction in the power necessary to actuate the steam distribution system — at 500 r.p.m. the poppet valves and their driving mechanism require only 3.30 horsepower.

2. BETTER LUBRICATION

Piston valves require lubrication over the entire sliding surface. Poppet valves require lubrication on their valve stems only, which are not in direct contact with the steam. The mechanisms actuating the poppet valves (valve gear box and cam box) are fitted with anti-friction bearings and operate in a bath of oil.

3. LIGHTER IN WEIGHT

A twelve inch piston valve weighs approximately 132 lb. The weight of the multiple poppet valves to be moved at one time is approximately 13 lb.

FRANKLIN RAILWAY SUPPLY COMPANY, INC. NEW YORK CHICAGO MONTREAL

Supply Trade Notes

VICTOR W. ELLET, president of the Hunt-Spiller Manufacturing Corporation, Boston, Mass., has become also vice-chairman of the board of directors.

◆

BALDWIN LOCOMOTIVE WORKS.—*R. Nevin Watt*, sales manager of the Standard Steel

R. Nevin Watt

Works division of the Baldwin Locomotive Works, has been appointed general sales manager, reporting to *William H. Harman*, vice-president in charge of sales. Mr. Watt will have general supervision over all sales of the Locomotive and Ordnance division and the Standard Steel Works division. The products of these divisions include steam, Diesel and electric locomotives, ordnance material, Diesel engines, steel forgings and castings, and rolled steel products. Mr. Watt was born in Philadelphia, Pa., in 1896 and entered the employ of the Standard Steel Works Company, now the Standard Steel Works division, in 1913. He was appointed sales manager in 1930.

Walker H. Evans has been appointed sales manager of the Standard Steel Works division. Mr. Evans was born in Kirk-

Walker H. Evans

wood, Mo., in 1891. After general experience in foundry work he entered the employ of the Baldwin Locomotive Works in 1916. He served in the shops and as erecting engineer in France until 1920 when he was assigned to the Chicago office of Baldwin, where he remained until 1932, when he became Philadelphia district manager for the Standard Steel Works division.

Joseph G. Broz, formerly sales manager for the Baldwin De La Vergne Sales Corporation, has been appointed sales manager of the Diesel division of Baldwin. His broadened activities will include the management of all the company's sales and service both of the Diesel locomotive and the Diesel engine business. Mr. Broz was born in St. Louis, Mo., in 1898. In 1922 he was placed in charge of sales of the Diesel division of the Fulton Iron Works Company of St. Louis, Mo., and in 1932 joined the De La Vergne Engine Company

Joseph G. Broz

as district manager at Kansas City, Mo. He became sales manager of De La Vergne in 1939.

Stewart McNaughton continues as sales manager for steam locomotives; *Clyde G. Pinney* as foreign sales manager; and *Gunther H. Froebel* as sales manager, ordnance and general products.

◆

JOHN HULST, vice-president of the United States Steel Corporation, retired July 2 upon completion of more than 40 years of association with the corporation and its subsidiary companies.

Obituary

ROBERT J. MAGOR, chairman and president of the National Steel Car Corporation, Hamilton, Canada, and chairman of the Magor Car Corporation of New York, died July 4 at Montreal, Canada. He was 60 years of age. After leaving Montreal high school, Mr. Magor took his first job with the Salada Tea Company. In 1906 he joined the Canadian Car & Foundry Co., serving in various capacities until 1910. He then went to New York as assistant manager of the Wonham, Magor Engineering Works, Passaic, N. J., which later became the Magor Car Company, and was elected president of that company five years later. In 1919, Mr. Magor and associates purchased the National Steel Car Corporation. During the period 1927-1930, he served as an assistant to the receiver for the Dominion Iron & Steel Co. of Canada. In 1931-1932 he was economic and financial adviser and relief controller to the Newfoundland government and negotiated the concession of the petroleum monopoly for the island to Imperial Oil, Ltd., which en-

Robert J. Magor

abled the government to meet interest charges on its national debt. In 1935 he aided the government of Alberta, Canada, in an advisory capacity.

◆

EMMETT K. CONNEELY, manager of railroad sales of the Republic Steel Corporation, Cleveland, Ohio, died at the Eye and Ear Hospital, Pittsburgh, Pa., on July 10. Mr. Conneely was born at Bolivar, N. Y., in 1884 and served in various capacities in the employ of the Pittsburgh & Lake Erie during his early business life, joining the Standard Steel Car Company at Baltimore, Md., in 1917. He later became associated with the New York Air Brake Company as vice-president and a director, and in 1925 was appointed New York representative of the Pullman Company. Mr. Conneely subsequently became vice-president of the Standard Steel Car Company at Chicago, in which position he remained until March, 1933. In September, 1933, he became manager of railroad sales, Republic.

◆

D. W. LLOYD, southwestern manager of the Westinghouse Air Brake Company, with headquarters in St. Louis, Mo., died July 4 following a critical operation. After being graduated in mechanical engineering from Pennsylvania State College, Mr. Lloyd entered the employ of the Westinghouse Air Brake Company in October, 1911. He was for some time associated with the company's engineering and commercial activities at Wilmerding, Pa. In 1928 Mr. Lloyd was transferred to the St. Louis office, as district engineer. He became southwestern manager in August, 1941.

◆

PHILIP D. BLOCK, chairman of the executive committee of the Inland Steel Company, Chicago, died in the Presbyterian hospital in that city on June 30. Mr. Block was born at Cincinnati, Ohio, on February 16, 1871, and, after graduating from high

(*Continued on next left-hand page*)

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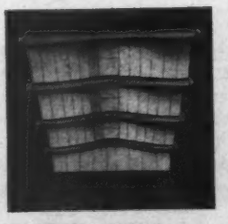
This high standardization reflects the engineering and experience of the American Arch Company.

It simplifies the application of the brick arch and saves the stores department a vast amount of trouble.

This foresight of the American Arch Company in adhering to standards is but one of the many ways in which the American Arch Company is serving the railroads.



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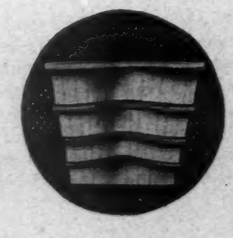
Refractory Specialists



AMERICAN ARCH CO.
INCORPORATED
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Locomotive Combustion Specialists

school in 1888, joined the Block-Pollak Iron Company, Cincinnati, Ohio, and Chicago, of which his father, Joseph Block, was

Philip D. Block

senior partner. In 1893, he became one of the founders of Inland, which was organized on October 3 and incorporated on October 30, and was elected a director and treasurer. Eight years later he was elected first vice-president and on July 29, 1919, was elected the fifth president of the company. On April 30, 1941, he became chairman of the executive committee.

◆

WILLIAM MORRIS HAGER, who retired in 1940 as vice-president of the American Car and Foundry Co., died on July 1 at Montclair, N. J. Mr. Hager was 74 years old. From 1899 to 1940 he served as an officer and director of the American Car and Foundry Co., having been successively assistant secretary, secretary, assistant to the president, and vice-president. He was also an officer and director of several of the company's subsidiaries.

◆

ROBERT F. RUNGE, vice-president of SKF Industries, Inc., Philadelphia, Pa., died July 6 in Germantown hospital after a prolonged illness. Mr. Runge was 56 years of age. He was a graduate of Drexel Institute in 1906. He then became employed in the engineering department of the Hess-

Robert F. Runge

Bright Manufacturing Company, which later became SKF. He became vice-president of SKF in 1920.

Personal Mention

T. HARRISON has been appointed works manager of the Ogden shops of the Canadian Pacific at Calgary, Alta.

W. N. MESSIMER, general car inspector of the New York Central, has been appointed assistant superintendent of equipment, with headquarters as before at New York.

A. E. CALKINS, superintendent equipment of the New York Central, Buffalo and East, has been appointed assistant to general superintendent of motive power and rolling stock of the system, with headquarters as before at New York.

A. B. COLVILLE, superintendent of motive power of the Great Northern at Spokane, Wash., has been appointed superintendent of motive power, with system jurisdiction, particularly over steam locomotives, with headquarters at Spokane.

A. D. BINGMAN, superintendent of equipment of the New York Central, lines west of Buffalo and the Ohio central lines, with headquarters at Cleveland, Ohio, has been transferred to New York, with jurisdiction over the equipment department, lines Buffalo and east and the Boston & Albany.

J. L. ROBSON, master mechanic of the Great Northern at Grand Forks, N. D., has become superintendent of motive power, with headquarters at St. Paul, Minn., and with system jurisdiction, particularly over Diesel-electric, electric and gas-electric locomotives.

WARREN ROBERT ELSEY, general superintendent of motive power of the eastern region of the Pennsylvania, with headquarters at Philadelphia, Pa., has been appointed assistant to the vice-president in charge of real estate, purchases and insurance. Mr. Elsey was born on April 1, 1892, at Pittsburgh, Pa., and is a graduate of the Carnegie Institute of Technology (1910). He entered railroad service on September 26, 1911, as a draftsman on the Pennsylvania at Pittsburgh. On March 16, 1916, he became piece-work inspector at Shire

Warren Robert Elsey

Oaks, Pa.; on July 16, 1917, shop inspector at South Pittsburgh, Pa.; on April 1, 1920, assistant master mechanic at Canton, Ohio; and on March 1, 1921, motive-power inspector of the Western Pennsylvania division. Mr. Elsey was appointed assistant master mechanic at Conemaugh, Pa., on February 1, 1923, and master mechanic at Baltimore, Md., on February 1, 1928. From January to December, 1929, he was acting superintendent of floating equipment at Jersey City, N. J., and on December 1, 1929, became superintendent of floating equipment there. Mr. Elsey was appointed mechanical engineer at Philadelphia on October 1, 1936, and general superintendent of motive power of the eastern region in January, 1941.

A. L. WRIGHT, assistant to the general superintendent of motive power of the New York Central at New York, has been appointed assistant superintendent of equipment, with headquarters at Cleveland, Ohio.

G. W. BIRK, superintendent locomotive shops of the Cleveland, Cincinnati, Chicago & St. Louis, at Beech Grove, Ind., has been appointed assistant to general superintendent of motive power of the New York Central System, at New York.

HENRY YOERG, general superintendent of motive power and equipment of the Great Northern at St. Paul, Minn., retired on July 1. Mr. Yoerg was born at St. Paul in 1871 and is a graduate of the Massachusetts Institute of Technology. He entered railway service in 1897 as a draftsman of the Great Northern and his first assignment was followed by several years of engineering duties along the system. In 1902 Mr. Yoerg was appointed superintendent of shops in Havre, Mont., and the following year returned to St. Paul as superintendent of the locomotive and car shops. In 1908 he became mechanical engineer and in 1917 assistant superintendent of motive power. Three years later he became superintendent of motive power and in 1935 was appointed general superintendent of motive power and equipment.

RAYMOND C. CROSS, assistant superintendent of equipment of the New York Central at Cleveland, Ohio, has been appointed superintendent of equipment, with headquarters at Cleveland. Mr. Cross was born in Cleveland, Ohio, on November 7, 1886, and entered the service of the New York Central as a machinist apprentice at the Collinwood (Ohio) locomotive shop on July 1, 1901. In June, 1911, he was promoted to gang foreman at the Collinwood enginehouse and in November, 1911, he resigned to go with the Chicago, Great West-

ern as an enginehouse foreman. Four years later he returned to the New York Central and served at various points as terminal foreman until April, 1930, when he became assistant master mechanic. He was appointed master mechanic at Collinwood in

Raymond C. Cross

March, 1934, and on April 1, 1939, assistant superintendent of equipment at Cleveland.

GEORGE S. WEST, general superintendent of the central Pennsylvania general division of the Pennsylvania, with headquarters at Williamsport, Pa., has been appointed general superintendent of motive power of the eastern region at Philadelphia, Pa. Mr. West was born at Altoona, Pa., on June 23, 1893, and is a graduate of Pennsylvania State College, where he received the degree of Bachelor of Science in railroad mechanical engineering in 1917. He entered the service of the Pennsylvania on June 14, 1909, as a laborer at the Olean (N. Y.) shops, working during the summer months while attending school as machinist helper, blacksmith helper, car repairman, draftsman and machinist. After graduation he became a special apprentice, Altoona

George S. West

shops, being furloughed for military service with the 19th Railway Engineers from July, 1917, to October, 1919. On November 1, 1920, he was appointed assistant road foreman of engines at Philadelphia and on February 15, 1923, became assistant master mechanic at New York. On November 1, 1923, he was appointed assistant engineer of motive power of the Central Pennsylvania division; on January 16, 1924, general foreman of the Cumberland Valley division; on June 11, 1924, assistant master mechanic of the New York division, and on June 1, 1928, master mechanic, which position he held successively on the Conemaugh, Buffalo and Philadelphia Terminal divisions. On January 1, 1931, Mr. West became superintendent motive power of the southwestern general division and on November 1, 1931, superintendent of the Monongahela division, being transferred to the Erie and Ashtabula division on September 16, 1932; to the Maryland division on July 1, 1933, and to the Pittsburgh division on April 1, 1935. He was appointed general superintendent of the southwestern division on February 1, 1937, being transferred to the Central Pennsylvania division on May 1, 1939.

IRA G. POOL, master mechanic of the Great Northern at Spokane, Wash., has been promoted to general superintendent of motive power and equipment, with headquarters at St. Paul, Minn. Mr. Pool was born in Minneapolis, Minn., in 1891, and entered the service of the Great Northern in 1920 as a locomotive designer. In 1925 he became a fuel supervisor for the Mesabi district. A year later he was transferred to Great Falls, Mont., as fuel supervisor

Ira G. Pool

for the Montana district, and in 1929 became assistant master mechanic of the Montana division, with headquarters in Havre, Mont. Later in the same year he was transferred to Whitefish, Mont., and in 1931 went to Klamath Falls, Ore., as master mechanic of the Klamath division. After subsequent assignments, he was transferred to Grand Forks, N. D., as master mechanic of the Dakota Division, and in 1941 was transferred to Spokane.

Master Mechanics and Road Foremen

C. R. JOHNSON, division engineer of the Central of Georgia at Macon, Ga., has been appointed road foreman of engines with the same headquarters.

D. L. RINGLER, has been appointed master mechanic of the eastern division of the Texas & Pacific, with headquarters at Marshall, Tex.

G. H. NOWELL, master mechanic of the Canadian Pacific, British Columbia district, at Vancouver, B. C., who has been transferred to the Saskatchewan district, with headquarters at Moose Jaw, Sask., as noted in the July issue, was born on November 13, 1885, at Montreal, Que. He entered the service of the Canadian Pacific on July 2, 1899, as a machinist apprentice at Montreal, and completed his apprenticeship on July 2, 1904. On January 15, 1913, Mr. Nowell was promoted to the position of erecting shop foreman at Ogden, Alta. He became locomotive foreman, with head-

G. H. Nowell

quarters at Cranbrook, on September 4, 1915; division master mechanic on December 5, 1915, with headquarters at Nelson, B. C., also at Revelstoke, B. C., Lethbridge, Alta., and Regina, Sask. He was appointed district master mechanic at Moose Jaw, Sask., on July 1, 1936, and district master mechanic at Vancouver, on October 16, 1937.

Car Department

H. L. HEWING, general car foreman of the Chicago, Milwaukee, St. Paul & Pacific at Chicago, has become general car department supervisor, Northern district, with headquarters at Minneapolis, Minn. Mr. Hewing's name was incorrectly spelled in the July issue.

R. L. CHANDLER, division general car foreman of the New York Central at Buffalo, N. Y., retired on June 30 after 47 years of service.

Shop and Enginehouse

ROBERT L. MORRIS, electrical-mechanical foreman of the Louisville & Nashville at Radnor, Tenn., has been appointed night foreman of the Diesel road locomotive shop at South Louisville, Ky.

SAMUEL CORNELL SNOW, machinist, of the Louisville & Nashville at South Louisville, Ky., has been appointed foreman of the Diesel road locomotive shop at South Louisville.

T. J. LYON, assistant general foreman of the New York Central at West Albany, N. Y., has become superintendent, locomotive shops of the Cleveland, Cincinnati, Chicago & St. Louis at Beech Grove, Ind.

(Turn to second left-hand page)

Time
GREAT NORTHERN
4000
THE MILWAUKEE ROAD
40
540
Rio Grande
540
SOUTHERN
6100
6100
ELECTRO-MO
GENERAL MOTORS CORPORATION

Everything

TIME is priceless. Fighting men cannot wait. Every minute — every hour — every day counts. One battleship this year is worth two in 1943. A thousand planes in 1942 are worth ten thousand in 1943.

In this battle of production, the railroads are faced with their biggest job in history — that of speeding America's enormous and ever increasing tonnage of materials, supplies and equipment, requiring the service of every available piece of rolling stock, especially locomotives.

In meeting this challenge, General Motors Diesel Road Locomotives are making possible many operating advantages which are vital to America at war, such as: — reduction in train miles as much as 50 per cent — faster schedules with fewer service delays — increased tonnage hauling capacity — and for each Diesel operated will release as many as five steam locomotives for other important services. And as more Diesels go into service, America's transportation network becomes that much stronger.

WHO SERVES THE RAILROADS — SERVES AMERICA

GENERAL MOTORS
LOCOMOTIVES

OVE DIVISION
LA GRANGE, ILLINOIS, U.S.A.

Purchasing and Stores

J. E. THRAFF, district storekeeper on the Great Northern at Great Falls, Mont., has been promoted to the position of assistant general storekeeper, a newly created position, with headquarters at St. Paul, Minn.

FRANKLIN J. STEINBERGER, assistant general storekeeper of the Atchison, Topeka & Santa Fe at Topeka, Kans., has been appointed assistant to the general purchasing agent at Chicago.

G. M. BETTERTON, purchasing agent of the Southern Pacific, Pacific lines, with headquarters at San Fracisco, Calif., has been appointed to general purchasing agent, with the same headquarters, a change of title.

J. E. MCMAHON, assistant purchasing agent and general storekeeper of the Chicago, St. Paul, Minneapolis & Omaha, with headquarters at St. Paul Minn., has had his title changed to that of purchasing and stores agent.

A. W. HIX has been appointed general purchasing agent of the Chesapeake & Ohio, the New York, Chicago & St. Louis, and the Pere Marquette. Mr. Hix was born at Bramwell, W. Va., in 1893 and entered railway service on November 24, 1908, as stenographer to the storekeeper on the C. & O., at Richmond, Va., In February, 1910, he was appointed stenographer to the assistant chief clerk and, after serving in various clerical positions, was promoted to assistant to the director of purchases and stores at Richmond in April, 1922. Mr. Hix was transferred to Cleveland in August, 1929, to serve both the C. & O. and the Pere Marquette in the same capacity and in 1931 was promoted to office manager for the assistant vice-president of the C. & O. and the Pere Marquette. Two years later he was appointed office manager for the vice-president of the C. & O. and in July, 1936, he was advanced to assistant to the chief purchasing and stores officer of the C. & O., the Nickel Plate and the Pere Marquette, which position he held until June 1, 1941, when he was promoted to assistant purchasing agent. In February, 1942, he was made acting general purchasing agent.

A. W. Hix

J. S. FAIR, JR., has been appointed to purchasing agent of the Pennsylvania, with headquarters at Philadelphia, Pa. Mr. Fair was born at Ft. Leavenworth, Kan., on December 22, 1905. He is a graduate of Cornell University (1928), with the degree of mechanical engineer. He entered the service of the Pennsylvania as a special apprentice on June 11, 1924, becoming motive-power inspector on October 3, 1930. After serving in several capacities at the Altoona works he went to Harrisburg, Pa., as gang foreman in the enginehouse on July 1, 1934, transferring to Philadelphia on February 7, 1935. The following month he was assigned to special duty in the purchasing department, later returning to the Philadelphia enginehouse. On October 1, 1936, Mr. Fair became office manager in the purchasing department and on July 16, 1938, he was appointed assistant to purchasing agent. On May 15, 1941, he became assistant purchasing agent; on February 1, 1942, assistant stores manager, and on February 16, 1942, acting purchasing agent.

J. S. Fair, Jr.

WILLIAM J. STURGES, purchasing agent of the Canadian National western region with headquarters at Winnipeg, Man., has retired from active service.

R. M. NELSON, general purchasing agent of the Chesapeake & Ohio, the New York, Chicago & St. Louis and the Pere Marquette, has retired at his own request.

WILLIAM S. RIACH, assistant general purchasing agent of the Atchison, Topeka & Santa Fe at Chicago, has been appointed acting general purchasing agent with the same headquarters for the duration.

Obituary

WILLIAM REED DAVIS, master mechanic of the Philadelphia division of the Pennsylvania, with headquarters at Harrisburg, Pa., died of a heart attack at the Enola yards on June 24, at the age of 49.

WILLIAM L. BEAN, former mechanical manager of the New York, New Haven & Hartford, died of a heart ailment at Santa Monica, Calif., on June 26. Mr. Bean was born on January 3, 1878, and graduated in mechanical engineering from the University of Minnesota in 1902. He immediately entered the service of the Northern Pacific as a special apprentice, and on January 1, 1905, became a gang foreman for the Atchison, Topeka & Santa Fe. The following year he was promoted to inspector and in 1908 to machine shop foreman. In 1909, he became division foreman, and a few months later, motive power assistant. In 1911, he was appointed bonus supervisor. Early in 1912 he entered the service of the Oxweld Railroad Service Company as chief engineer, remaining with that company until 1916. Mr. Bean entered the employ of the New Haven in July, 1916. In September, 1917, was appointed assistant general mechanical superintendent; on November 1, 1918, mechanical assistant to the president, and on December 1, 1923, assistant mechanical manager. In June, 1925, Mr. Bean was appointed mechanical manager, with headquarters at New Haven, Conn., in which position he served until the latter part of 1929. He was for a time the western representative of the Leslie Company and in September, 1933, was appointed mechanical assistant to V. V. Boatner, western regional manager on the staff of the federal co-ordinator of transportation. Mr. Bean was president of the New England Railroad Club, 1925-26.

Trade Publications

Copies of trade publications described in the column can be obtained by writing to the manufacturers, preferably on company letterhead, giving title. State the name and number of the bulletin or catalog desired, when it is mentioned.

SILVER ALLOY BRAZING.—Handy & Harman, 82 Fulton street, New York. An eight-page, illustrated bulletin entitled "Silver Alloy Brazing of Fabricated Copper Piping," a process described as presenting "very few problems" and which "can be successfully accomplished by inexperienced men having as little as a week to ten days intensive training."

◆

LUBRICATION OF CINCINNATI MACHINES.—The Cincinnati Milling and Grinding Machines, Inc., Cincinnati, Ohio. Publication No. M-1084. Lubricating instructions, with diagrams, and specifications for Cincinnati, milling, broaching, grinding and lapping machines. Instructions based on an eight-hour day.

◆

TIME-SAVER GUIDE FOR DIESEL MAINTENANCE.—Department 7-N-20, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. Twenty-page booklet of practical suggestions and time-saving methods for modern Diesel-electric maintenance. Tips on general inspection, hints on preventive maintenance; tells how to reduce wear; lists parts to stock to save repair time; where to get renewal parts, and how to speed repair service. Lists recommended renewal parts prepared after a careful study of most frequently used parts. Problems of Diesel locomotive operation, not encountered in the operation of steam engines, discussed and solutions offered.